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# ATM upstart heads straight to the desktop

BY SKIP MACASKILL

Ask Ralph Ungermann and he'll tell you in no uncertain terms: ATM is the desktop network technology for the multimedia future.

In fact, Ungermann is so sure of that he's betting his future on it. His newest venture, First Virtual Corp. (FVC), this week is expected to roll out a suite of Asynchronous Transfer Mode-based hardware and software networking products that includes a multimedia server and a unique piece of middleware that extends ATM capabilities to traditional network operating systems (NOS).

The best part for users: FVC is promising high-speed multimedia networking for between \$500 and \$800 per end station — the price of a typical switched Ethernet connection and at least half the price of current ATM implementations.

See ATM, page 136

### INSIDE

Lawyer Martha Siegel ignited a controversy by disseminating ads on the Internet; now she squares off against Anthony Rutkowski of the Internet Society in this week's Pro/Con. Pree 67.



Survey says network salaries are on the rise again, but this time the compensation rules are changing. Page 69.

Our Buyer's Guide finds router vendors are ready to make the transition to ATM and LAN switching, but users need to tread carefully. Page 77.

SunNet Manager survives our review, proving adept at monitoring LANs via



READER ADVOCACY FORCE

# **How Microsoft controls** the future of networking

A software monolith sets the standards for the industry.

BY BARB COLE AND KEVIN FOGARTY

Microsoft

If standards are the key to interoperability, Microsoft Corp. may have more control over your distributed computing environment than any other organization.

By dint of its hold over millions of desktops, Microsoft has established itself as an arbiter of key network The first of a 3-part series. ings from independent and applications stan-

dards. In this client/server world, the company now wields more power than such traditional standards-setting bodies as the International Standards Organization (ISO), according to many observers.

Users, vendors and others agree that Microsoft's power to create de facto standards loom large over the industry. But they are ambivalent about that power.

Some believe Microsoft has too much control over customers' desktop networks and

they complain that Microsoft's standards are too Windows-centric. Others don't care about the company's influence; they're happy to have solutions to interoperability problems that standards organizations often take agonizing years to resolve.

Among the company's de facto standards supported in Microsoft's own products and thousands of offersoftware vendors (ISV)

are the Open Database Connectivity (ODBC) protocol for heterogeneous database access, the Messaging Application Programming Interface (MAPI), and Object Linking and Embedding (OLE), a mechanism for linking applications.

Microsoft isn't stopping there. The company is working with Intel Corp. to develop specifications for computer-telephony integration and with Texas Instruments, Inc. to See Microsoft, page 128

BY MICHAEL COONEY

In the battle to maintain control over SNA backbones, IBM last week drew a line in the sand and dared router vendors and other would-be competitors to offer better ways to build mainframe-based multiprotocol back-

Riled-up IBM

router rivals

challenges its

IBM executives, as expected, announced a complete revamping of the company's router line (NW, Aug. 15, page 1). But that was only one part of an aggressive new strategy designed to help users integrate controller-based Systems Network Architecture environments with router-based internets.

"We are saying to the competition that if you want to attack us in the area of mainframe channel-attached devices, that's where we will kill you," said Rick McGee, director of IBM's See IBM, page 133



**Department Manager Wayne Fuller** 

# **Integrator fills** big hole in net management

BY JIM DUFFY

Reston, Va.

Although there are a host of questions swirling around Asynchronous Transfer Mode, Stanford Telecommunications, Inc. thinks it has answered one of the big ones: network management.

The systems integrator has developed a distributed management application for ATM that addresses virtual network reconfiguration, routing table updates, cost calculations, and performance and fault management. The U.S.

See Stanford, page 133

# Charges of a Big Three oligopoly hover amid telecom reform talk

BY JOANIE WEXLER

On the eve of the Senate's examination of the Communications Act of 1994, which could change the face of longdistance competition, the industry is struggling with claims that the Big Three carriers constitute an oligopoly a marketplace controlled by a few big sellers.

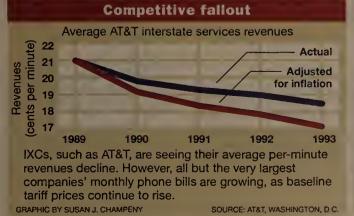
Most users agree that AT&T, MCI Communications Corp. and Sprint Corp. compete fiercely on new services,

which has resulted in a rich set of consumer choices. However, the carriers have taken to mimicking each other on pricing, possibly indicating there's room for a few more strong players, such as the eager regional Bell holding companies.

Overall, competition has been a boon to all users during the past decade. Average longdistance rates have plunged

by nearly two-thirds, in part because competition keeps the players honest and new technologies - such as highcapacity fiber-optic networks - provide savings.

But as in many industries, the price benefits are skewed in favor of the country's largest customers. For the past two years, the Big Three carriers have for the most part See Big Three, page 134



**NEWSPAPER** 

100

# Briefs

Internet providers plck MCI. MCI Communications Corp. has won a four-year contract to provide T-3 TCP/IP-based backbone services to eight regional Internet providers — NEARNet, BARRNet, CICNet, MIDNet, SURANet, SesquaNet, MICNet, NorthwestNet — and the national Canadian network provider CA\*Net.

The contract gives MCI about 40% of the current Internet traffic, and sources said it is a prelude to a nationwide rollout of commercial IP services from MCI before year end.

At least it has a name. Although the delivery date for Microsoft Corp.'s next-generation operating system — code-named Chicago — is still unclear, the company has settled on a name for the product: Windows 95. "At least that tells you Microsoft is committing to a year for release," said one analyst. Paul Maritz, senior vice president of systems and technology at Microsoft, confirmed Windows 95 is slated for release during the first half of next year.

A free hub with every missile. Defense contractor Raytheon Co. last week announced it will purchase Xyplex, Inc. for an estimated \$171 million — 50% more than what the company is worth, according to some analyst estimates. Raytheon, best known for its missile and weapons system work for the U.S. government — including the Patriot missile made famous during the Gulf War — will enter the network market with a full line of terminal servers, hubs and routers.

**Coming to America.** Fujitsu, Ltd., the world's second largest computer company, this week will announce plans to enter the U.S. network management market. The company will make available an English version of its NetWalker management platform for \$4,500. NetWalker supports centralized management of TCP/IP LANs and WANs using the Simple Network Management Protocol and the Remote Monitoring Management Information Base.

**Databases meet E-mail.** CE Software, Inc. in West Des Moines, Iowa, this week will introduce a middleware product that will let users share information between relational databases and E-mail, as well as workgroup applications such as scheduling and calendaring software. The product, CE Groupware Architecture, is designed to let users query relational databases via E-mail and receive responses the same way. It will work with CE's Quick-Mail and other E-mail products, company officials said.

CE: (800) 523-7638.

**Do the math.** Computer Associates International, Inc. has cut prices of its CA-Ingres database by about 57% percent and beefed up its standard support policy to include "7-by-24" phone support. The change brings CA-Ingres more in line with competing products from Oracle Corp. and Sybase, Inc.

**Virtual accounting.** Internet gurus Marshall Rose and Einar Stefferud have teamed with Lee Stein, president of Stein and Stein, to form a new company called First Virtual Holdings. While the three partners are close-mouthed about what they are up to, sources said the company will seek to foster business traffic on the 'Net by providing a system for automated accounting for electronic transactions.

**Digital processes TCP/IP.** Digital Equipment Corp. last week said it will license TCP/IP code from Process Software Corp. in Framingham, Mass., to enhance its TCP/IP Services for OpenVMS in time for a new release this fall

The two companies also said they will converge TCP/IP Services and Process' TCPware software into a single product to be offered by both companies. They did not disclose a timetable for doing so.

### Contacts

ADDRESS: Network World, 161 Worcester Rd., Framingham, MA 01701. PHONE: (508) 875-6400; FAX: (508) 820-3467; INTERNET: network@world.std.com.; BBS: Interact with other readers: download free software, submit letters to the editor, leave news tips, change of address requests or hunt for jobs by using your IBM, Apple or other computer to dial into the BBS at speeds up to 9.6K bit/sec by dialing (508) 620-1178 or (508) 620-1160. READER ADVOCACY FORCE (R.A.F.) HOTLINE: Contact us with story tips about pressing user issues, (800) 622-1108, Ext. 487; NETWORK HELP DESK: Contact Dana Thorat via any of the above means.

# **Table of Contents**

### **NEWS**

HP and Cisco promise to collaborate on internetworking product development, which could bring new products to the market. Page 4.

**Wellfleet to unveil** an ATM interface for backbone nodes. *Page 4*.

**Ameritech slates** an ATM debut as BellSouth reveals ATM prices. *Page 4*.

**Cisco goes after** low-end with 15-product blitz. *Page 6*.

The Department of Commerce proposes new net guidelines for the federal government. Page 6.

ucts designed to simplify the integration of its new mainframes into enterprise client/server nets. Page 8.



Cascade adds T-1 ATM module to its 9000 switch. Page 10.

**GSA lifts a software buying limit** imposed on federal agencies that purchase products off GSA contract lists. *Page 10*.

**Proteon set to embrace** Ethernet market with full suite of offerings. *Page 11*.

**Cheyenne to take** the backup of network files to a new level with the release of its HSM. *Page 12*.

**Start-up offers new** tools to do business on the Internet. *Page 12*.

### **ENTERPRISE INTERNETWORKS**

### **LEGENT's new**

**version** of its troubleticketing system offers improved systems management. *Page 17*.

**Presticom adds** frame relay to branch office router. *Page 17*.

### **LAN WORLD**

**IBM to announce** the latest version of its LAN Server. *Page L1*.

Hot LAN tools: No excuses! Page L1.

### **GLOBAL SERVICES**

**IXCs, others dangle** the final ISDN carrot in front of the telcos. *Page 41*.

Frame relay nets and road warriors are on a collision course. *Page 41*.



### **CLIENT/SERVER APPLICATIONS**

**Software AG aims** for the enterprise as it beefs up its Natural apps development language. *Page 55*.

Financial firm finds big savings in mainframe data gateway. *Page 55*.

### **OPINIONS**

- CyberSpeak: How do you think the acquisition of WilTel by LDDS will affect the long-distance telephone industry? Page 8.
- Ed Krol on the Internet fever. Page 31.
- Mark Glbbs on Congress and telecom. Page L21.
- Eric Paulak on SMDS. Page 52.
- Anura Guruge on IBM LAN options. Page 66.
- Editorial on the power of Microsoft. Page 66.
- Letters. Page 101.

### **NEXT WEEK:**

Our special issue on NetWare will examine a pivotal product line caught in a slow-moving transition from workgroup to enterprise net services. Three analysts will offer their insights into the issues that lie ahead for Novell.

# Network HELP desk

Network World tracks down answers to your questions regarding products, services, technologies or disputes with vendors. Please submit questions to Dana Thorat at (800) 622-1108, via fax at (508) 820-1103 or (508) 820-3467, via a message on the Internet at djt@world.std.com or via CompuServe at 73244,2673.

Do you know of any Novell, Inc. Net-Ware server mirroring software that works similar to NetWare SFT III but does not require the additional hardware? Jim Yeager, Kansas City, Mo.

Ron Nutter, a network systems engineer at IntraSource, Inc., a Novell Platinum authorized reseller and service center in Lexington, Ky., replies:

The only product I know of that works similar to Net Ware SFT III is Vinca Corp.'s StandbyServer. Using standard NetWare mirroring, StandbyServer duplicates data to an on-line secondary server if a primary NetWare 3.11, 3.12 or 4.01 file server fails.

StandbyServer has many of the same benefits of



See Ron
Nutter at
NetWorld+
Interop's
Network Help
Desk Clinic on
Tuesday at
2 p.m. in the
Product
Presentation
Area, Room 2.

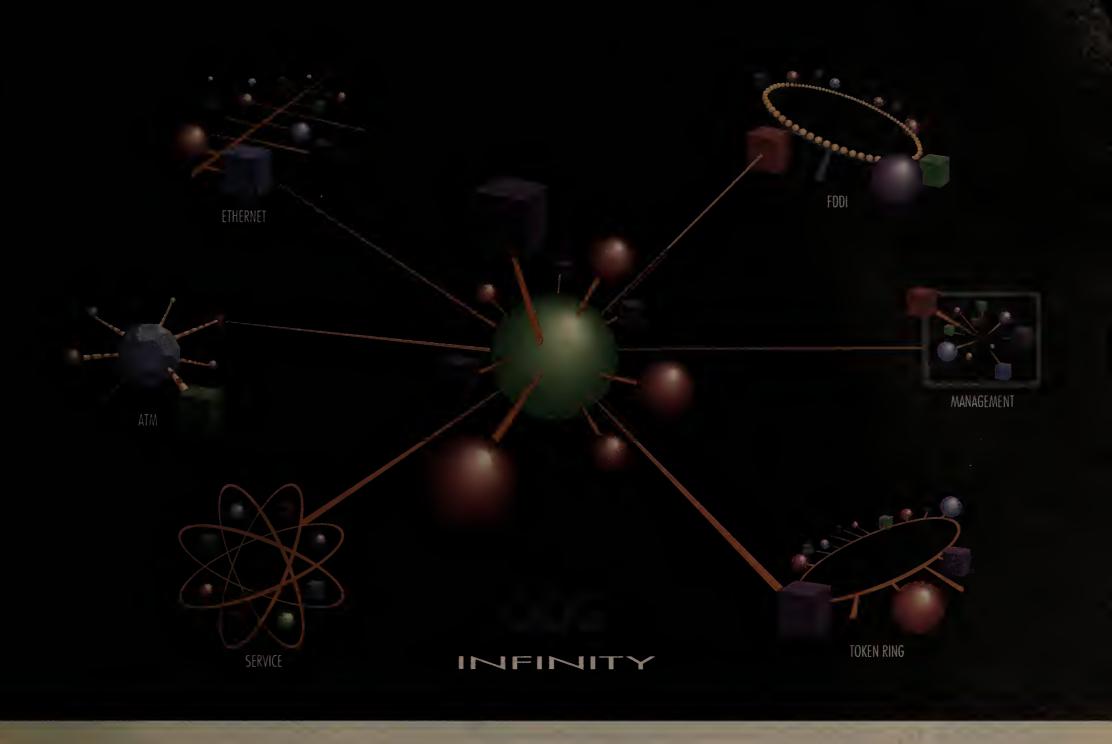
SFT III except for the automatic switchover feature. But StandbyServer can be switched with less than 10 keystrokes to a secondary server and users can be back on-line in a matter of minutes using their original files and passwords.

And unlike SFT III, the standby computer need not be identical to the main server; you can use your existing hardware for the standby machine. But it must be capable of running either Net-Ware or DOS 5.0 or greater.

Prices for StandbyServer, which include software, two adapter cards and a 25-foot cable are \$1,695 for Industry Standard Architecture (ISA) adapter cards and \$1,995 for Extended ISA and Micro Channel Architecture (MCA) cards. For more product information, call (801) 223-3100 or (800) 934-9530.

Where can I find information on ATM, in layman's terms?

Edward Cambridge, Augusta, Ga.
See Help desk, page 104



# A UNIVERSE OF NETWORKING SOLUTIONS WITH ODS INFINITY™ SWITCHING HUBS

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## Ameritech and BellSouth plan ATM rollouts

BY DAVID ROHDE

A gigacell is 1

containing 48

information.

quality video

approximately

4M bytes of

second. So a

gigacell gives

you 12,000

seconds,

or 3.3

hours,

of video.

**Broadcast-**

useable

requires

data per

billion bytes of

billion ATM cells

Ameritech Corp. and BellSouth Corp. this week will unveil distinctive pricing strategies for their new Asynchronous Transfer Mode services.

Ameritech will unveil a distance-sensitive pricing plan during the announcement of its commercial ATM availability at the NetWorld+Interop show here. Meanwhile, an ATM tariff filed by Bell-South offering usage-sensitive pricing will go into effect on Wednesday in the state of North Carolina.

BellSouth's pricing scheme seems to give its intended customer — the North Carolina state government — an exceptionally favorable rate, at least until monthly minimums kick in during 1996.

It starts with a flat monthly charge of \$1,025 per month per site, well below other regional Bell holding companies' monthly rates. Pacific Bell, for example, charges a minimum of \$4,850 per month for unlimited usage.

On top of the monthly fee, BellSouth will charge the government \$28 per giga-

cell of transmitted data. A gigacell — or one billion 53byte cells, each with a 48-byte payload — contains a vast amount of information, such as an estimated 4.8 million pages of formatted WordPerfect text.

Ameritech's ATM offering is more broad-based, with the carrier's commercial offering open to all two years after the tariff's effective date of Sept. 14.

comers starting Nov. 1, according to a spokesman for Ameritech's Enhanced Business Services division.

Service will be offered initially in Chicago, Detroit, Indianapolis, Milwaukee, Cleveland and Columbus, Ohio, the person said. And sometime after Nov. 1, service is expected to start in Dayton, Ohio.

Unlike BellSouth's offering, Ameritech's ATM service will offer access speeds as low as T-1, matching recent low-speed ATM offerings by Pacific Bell (NW, Jan. 10, page 9) and Bell Atlantic Corp. (NW, Aug. 1,

Even without T-1 access, BellSouth's pricing provides cost-effective throughput for North Carolina's

government agencies and school districts, said Christine Heckart, senior analyst for TeleChoice, Inc., a consultancy based in Verona, N.J.

By contrast, she frowns on Ameritech's distance-sensitive pricing. Such a scheme is appropriate for interexchange carriers who want to differentiate among customers "because it gives them the opportunity to offer a lower price to geographically concentrated [organizations]." But charging a mileage fee for LEC traffic, which can only travel within tightly defined regions, could penalize users, she suggested.

However, because Ameritech is not filing a formal ATM tariff, each arrangement will be priced individually, giving the carrier the opportunity to come up with a pricing plan that is beneficial overall for an individual user.

And BellSouth's North Carolina pricing contains a potential time bomb — a requirement that the state commit to 16,000 gigacells of usage per month starting in 1996, equating to \$448,000 in usage charges.

But the state has an out: The prices are renegotiable

Key areas of focus for HP and Cisco

100VG-AnyLAN interfaces for Cisco routers

Tighter integration of network management

Routing modules for HP's AdvanceStack

Interoperability between Cisco and HP

# **Novell changes course** with AppWare strategy

BY PEGGY WATT

Novell, Inc. last week outlined how it will streamline its product line by paring down its AppWare lineup while marching ahead with a deliverables schedule for the SuperNOS that combines NetWare and Unix.

In a preview of this week's Net-World + Interop announcements, company executives said they plan to forge ahead with the more intuitive portion of AppWare — Visual AppBuilder but will drop the AppWare Foundation.

The SuperNOS, officially introduced last spring by Robert Franken-

berg after he became president and chief executive officer, will proceed on a threeyear timetable, resulting in a common code base between NetWare and UnixWare.

Executives emphasized their focus on Frankenberg's model of "pervasive computing" with NetWare as an integral part of the myriad nets that provide tools for work FRANKENBERG and pleasure, ranging from

Internet access to interactive home-

shopping.

The AppWare Foundation, which was intended to let independent software vendors (ISV) and corporate developers build applications that could be ported to many platforms, apparently did not fit in that scheme.

'There isn't enough customer interest," said Frankenberg, who spoke at a Corporate Association for Microcomputer Professionals meeting here last week. "Most application developers are writing for only one or two platforms, and there are bigger opportunities for Novell."

Users and Novell resellers shrugged off the dismissal of the AppWare Foundation."Let Novell do what it does well - the server," said Jerry Sergott, president of JSI, a network ISV in Oak Lawn, Ill. Users at the conference said they had not embraced AppWare and would not miss it.

But Novell watcher Jamie Lewis of The Burton Group in Salt Lake City called killing the AppWare Foundation "a very disturbing development."

"Novell is an infrastructure company, first and foremost; it has to provide the foundation. Without App-Ware, Novell has no application framework story," Lewis said. "They're playing right into Microsoft's hands.'

Frankenberg acknowledged that he

has met with Microsoft Corp.'s Bill Gates to promote better cooperation between the two companies, but said Novell is not conceding anything.

The Novell chief also took aim at Lotus Development Corp., saying, "Novell will have groupware products to compete with Lotus Notes," a reference to Groupwise, formerly known as WordPerfect Office.

Executives described groupware that goes beyond PC applications to integrate data, telecommunications, video, voice mail and electronic mail directories. Frankenberg said the integration of the piece parts would be

seamless and natural enough to let users focus on the task, not the tools.

"You don't have to know how a PBX works to use it, and we all know how to use the telephone," he said.

'In a few years, all appli cations will be networked, said Drew Major, Novell' chief scientist. "Everything should have networking capability built in to truly

function in pervasive computing.'



### **SUPERNOS**

On the operating system side, the SuperNOS is described as Unix on top of NetWare and is another of Novell's

'Novell's been a driver in upsizing PCs to networking; Unix is key in downsizing operations," Major said, explaining what Novell considers a natural pairing of the two operating systems.

The first of the shared components will ship this year, featuring the two operating systems' implementations of symmetric multiprocessing, standard logic through the Open Data-Link Interface, and support for IPX and TCP/IP.

"This is the foundation layer for net work services," Major said.

Next year, Novell intends to deliver modular components that include management, security, directory services and clustering.

By 1996, Novell expects to provide a common code base between NetWare and UnixWare that will be the fully scalable SuperNOS, supporting distributed processing, fault-tolerant technology

"Look for more and more shared code between NetWare and Unix, Major said. "In some cases, applications will be binary-compatible between Net Ware and Unix."

### Adoption of common internetworking and LAN standards, including router protocols, bandwidth-on-demand and multimedia Wellfleet's ATM Link Module connects the com-

# **HP and Cisco draft** hub, router plans

**BY JIM DUFFY** 

stackable hubs

Hewlett-Packard Co. and Cisco Systems, Inc. last week promised to collaborate on development and interoperability initiatives that could bring new products and management tools to market.

The deal should result in products that provide 100VG-AnyLAN support in Cisco routers and routing capabilities for HP hubs. The companies will also work toward interoperability of their internetworking products and integration of their net management wares, as well as adoption of common LAN and internetworking standards.

Analysts said users should get greater network flexibility from the wider array of products.

"It really gives them alternatives to select [the] See HP, Cisco, page 131

### CORRECTIONS

An incorrect phone number was printed for the SQL Access Group (Aug. 29, page 31). The correct number is (603) 434-0802.

A recent story (Aug. 29, page 31) misstated the version of Powersoft Corp.'s Power-Builder application development tool that will be able to generate code that runs on servers and use Watcom compilers to generate machine code. The features will be included in unspecified versions beyond 4.0.

# Wellfleet to unveil **ATM** interface for backbone nodes

BY JIM DUFFY

Wellfleet Communications, Inc. this week will make good on an earlier promise when it unveils an Asynchronous Transfer Mode adapter for its backbone routers at the Net World + Interop show here.

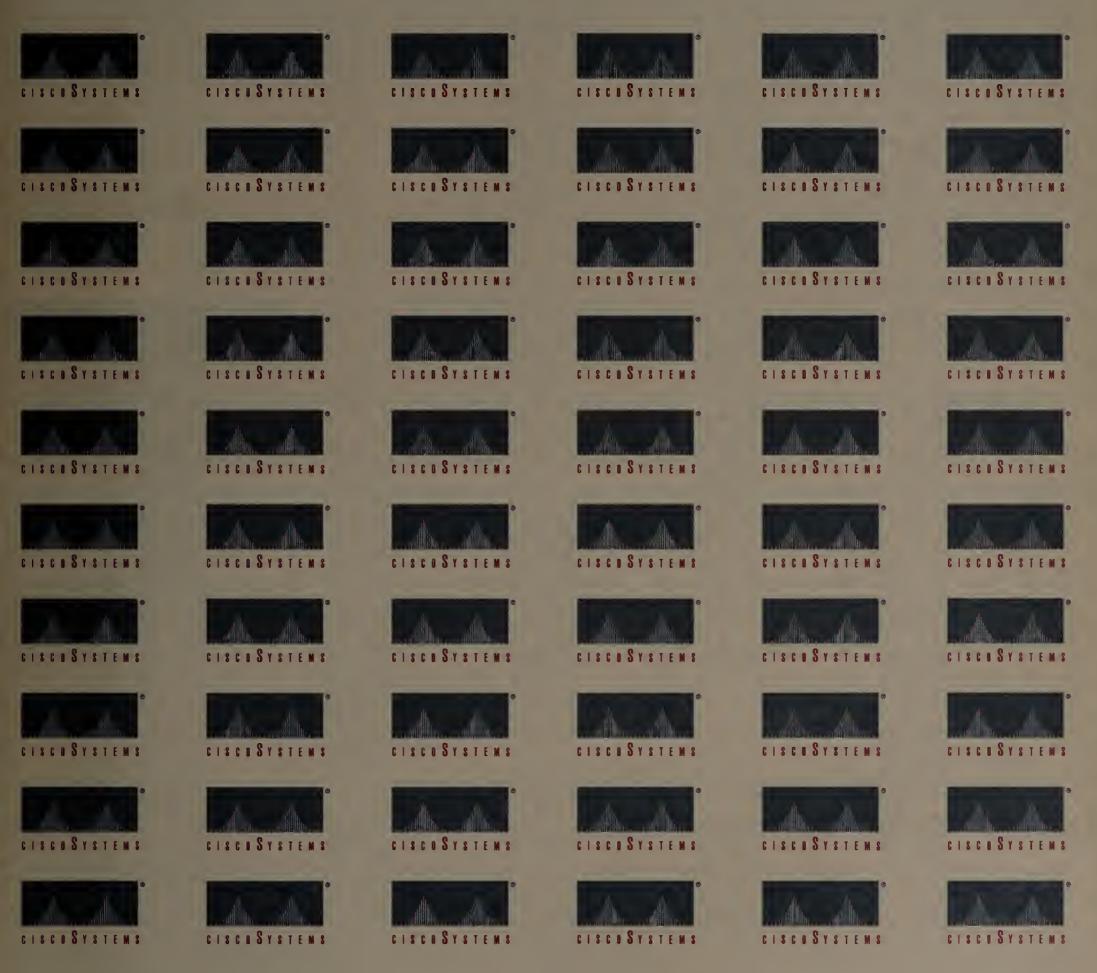
pany's Backbone Concentrator Node and Backbone Link Node routers to ATM switches at speeds up to 155M bit/sec. The module, which one analyst described as pricey, is positioned as a migratory step to switched ATM networks from shared-media LAN

Wellfleet disclosed plans almost two years ago to release the module as part of a three-phase ATM strategy (NW, Oct. 26, 1992, page 1).

The ATM Link Module sports 155M bit/sec Synchronous Optical Network (SONET) interfaces for multimode and single-mode fiber, and a 100M bit/sec Transparent Asynchronous Transmitter/Receiver Interface (TAXI) interface for multimode fiber. In the second half of 1995, it will support 45M bit/sec DS3 and E-3 links, said Stephen Collins, director of ATM product marketing at Wellfleet.

The module supports the ATM Forum's public and private User Network Interface specifications, meaning it should connect to any other vendor's ATM gear that also supports these specs. The ATM Link Module also supports permanent and switched virtual circuits, as well as ATM cell segmentation and See Wellfleet, page 131

# Here's A List Of All The Companies That Can Solve All Of Your Low-End Internetworking Problems.



As you can see, no other company gives you more low-end internetworking solutions. With Access by Cisco, we've expanded our access product line to meet your low-end internetworking demands. From software-only routers to PC cards to enterprise remote servers. And as part of our completely scalable product line, Access by Cisco gives you a low-end platform that expands according to your internetworking needs. Also, our exclusive Internetwork Operating System ensures that your network can talk to any other network regardless of protocol, medium, or platform. If you're considering a low-end router, why not get an expert opinion? Call us at 1-800-859-2726. You'll see there is only one answer.

Access by Cisco<sup>™</sup> Bringing the power of internetworking to everyone<sup>™</sup>

BY SKIP MACASKILI

UB Networks, Inc. will revamp its product strategy by year end and shift its focus from high-end hubs to a distributed approach based on a new series of smaller devices that incorporate new technologies.

This strategy, dubbed Access Anywhere, is designed to give users more flexible configuration options, letting devices be installed at the most strategic places in the net, not necessarily the most central.

### **Revamped strategy**

UB's new product direction, dubbed Access Anywhere, includes:

- Less emphasis on "hub-of-hubs" approach.
- Move toward fixed-port devices that support a variety of technologies and offer configuration flexibility.
- Partnerships with other vendors for key technologies.
- Entry into the network border switch market.
- Continued emphasis on net management development.

The direction is most similar to that of rival 3Com Corp., which has forsaken the development of a complex next-generation hub such as Cabletron Systems, Inc.'s MMAC-Plus or SynOptics Communications, Inc. 's Lattis System 5000 for a line of stackable devices supporting different technologies that users can mix and match as needed.

The concept of using "a big hub of hubs as the mainframe of the network is wrong," said Roel Pieper, president and chief executive officer at UB, formerly Ungermann-Bass, Inc. "We want to develop smaller, more sophisticated hubs that combine routing and switching capabilities and place more net intelligence closer to the user where he needs it."

Historically, UB has been perceived as a high-end hub maker with an excellent track record in Fortune 500 installations. And while Access Anywhere is designed to focus on the workgroup area where UB is the most vulnerable, it does not indicate an abandonment of its high-end roots, according to UB officials.

"We are not forsaking one market for another," said Tyrone Pike, general manager of the Network Products Division. "This represents a major shift in our product mentality but includes folding high-performance networking technologies into both a new class of stackables as well as our existing Access/One intelligent hub."

A major part of UB's strategy is developing devices that will tie its existing shared-bandwidth installed base with emerging Asynchronous Transfer Mode switching environments that will be anchored by the company's recently announced ATM GeoSwitch.

The first offering in that product set is an Ethernet-to-ATM switch, code-named Spitfire, that will act as a gateway between Ethernet LANs and ATM nets.

"Since GeoSwitch will ship by year end, users can expect the first of these new rim products to be available in the same time frame so new ATM environments and existing nets can be integrated," Pike said.

This market has swelled recently as a new group of start-ups, including Agile Networks, Inc., Centillion Networks, Inc., NetEdge Systems, Inc., NiceCom, Inc. and Xylan Corp., have announced net border switches. The more established players such as Cabletron and SynOptics will also have entries in this area.

In order to help users manage these new integrated environments, UB will continue to migrate its net management offerings - which have been traditionally focused in the OS/2 market — into the Unix-based area dominated by Hewlett-Packard Co. OpenView.

According to industry analysts, UB has not done a good job lately of generating new accounts, especially in the high-end market, so getting into a new area may help rejuvenate business.

"In this hub market, stagnation is death, so it's a good idea that UB is prepared to move beyond where they've been in the past," said Fred McClimans, principal at Decisis, Inc., a consultancy in Herndon, Va. "The move will open up new territory for them and not do any damage to its installed base of large high-

**GOVERNMENT NETS** 

# Feds terminate rules that limited software purchases

BY ELLEN MESSMER

Washington, D.C.

week took the first step to revoke the Government Open Systems Interconnection Profile (GOSIP) data networking requirements by issuing proposed new rules to end the mandate.

enacted as rules sometime after the 45day public comment period, would let managers at federal agencies purchase any type of data networking equipment they want without violating regulations.

As part of the policy overhaul, the Commerce Department also ended the mandatory purchase of network management equipment conforming to the Government Network Management Profile. And in a document released last

week called "Profiles for Open Systems Internetworking Technologies," the government elevates the TCP/IP suite of standards set by the Internet Engineering Task Force (IETF) to equal status with OSI as an open systems standard.

The Commerce Department is basing its new policy direction on the Federal Internetworking Requirements Panel report that a group of federal network managers issued last May after nearly a year

The initial rationale

suites — OSI and TCP/IP.

# Cisco plans low-end blitzkreig at show

BY JIM DUFFY

Cisco Systems, Inc. this week will attack the low end of the internetworking market with 15 new products in its arsenal.

The products include router cards for personal computers, boundary access devices and extensions to the 2500 line, including two Ethernet hubs.

"This gives them a very broad range," said one analyst who requested anonymity. "It will be interesting to see the competitive response."

At the NetWorld+Interop show here, Cisco will unveil routing cards that fit into a PC expansion slot. The AccessPro PC Cards will run Newport Systems Solutions, Inc. routing software, support either one Ethernet or one token-ring LAN and a single T-1 link. I ney will cost \$1,995, said analysts briefed by Cisco.

Cisco will also roll out new stand-alone remote access devices. The 1000 series include two models, each sporting a single Ethernet and either a V.35 or X.21 T-1 link. Both models will cost around \$1,595.

The 1000 series will also support economical remote routing through a technique Cisco calls LAN Extension. Analysts likened LAN Extension to 3Com Corp.'s Boundary Routing, whereby a remote router off-loads routing table maintenance to a backbone router (NW, Aug. 29, page 12).

Cisco will also unveil several additions to its 2500

line, including two routing hubs. The hubs, dubbed the 2505 and 2507, will support eight to 16 Ethernet ports and two synchronous wide-area ports. Pricing was not available for these devices.

The firm will also unveil four "access servers," models that feature one Ethernet or one token-ring attachment, two synchronous T-1 links and from eight to 16 asynchronous ports running at 28.8K bit/sec.

All models will cost over \$2,000, analysts said.

Lastly, Cisco will unwrap three "dual LAN, dual WAN" devices, dubbed the 2513, 2514 and 2515. Each will support two Ethernets, two token rings or a mix. They will also feature two T-1 synchronous ports. Pricing was not available at press time.

"Reducing the cost of low-end routing products is good because it means we can interconnect a greater number of clients for less money and extend the reach of our enterprise," said Vince Fuller, technical director at Bay Area Regional Network in Palo Alto, Calif.

'Cisco must become more competitive in that market," said Cisco user Clem Bowen, systems programmer at Buck Consultants in Secaucus, N.J. "A great deal of their future sales will be tied to smaller shops that want to do some routing."

All products will be available in October. Cisco declined to comment.

- Senior Editor Skip MacAskill contributed to this story.

The Department of Commerce last

The proposed changes, likely to be

of deliberation.

behind the report had been to determine how the government might bring about convergence between the

two primary competing open standards

### **AFFINITY GROUPS**

But members of the group, which was headed by Department of Defense Telecommunications Director Diane Fountaine, went further afield. Frustrated by interoperability gaps in OSI products and lured by the growing influence of TCP/IP, the federal network managers concluded that the government should ditch mandatory stan-

Instead, the report suggests federal agencies could work toward interoperability by forming attinity groups that would look at specific functions, such as electronic mail.

Outside the government, in companies that had long supported the government's GOSIP effort, there was disappointment and exasperation with last week's proposed Federal Information Processing Standard to end it all.

"The panel was never authorized to do this," pointed out Gary Workman, staff development engineer at General

Motors Corp. And what's worse, in the interim it "missed the opportunity to influence the next-generation Internet Protocol," he said, noting that the IETF's newly created IPng will be hard to integrate into OSI's Connectionless Network Protocol

The apparent lack of required government network standards could create problems for companies communicating with the government. "This will end up requiring us to support multiple protocols to communicate with multiple government agencies," Workman said.

But federal agency managers back ing the Commerce Department's deci sion to drop the GOSIP mandate sough to provide assurance that the new policy is not the free-for-all it may seem at first glance.

### Government's new affinity groups

Plans put forward by the following groups are intended to foster interoperability across the government and private sectors.

- 1. Providers and recipients of electronic
- Users needing access to government information and services
- The law enforcement and public safety
- The tax community: preparers, payers
- Producers and consumers of international trade data
- Producers and consumers of environmental data
- Government E-mail users
- Government network managers Government research community
- 10. Electronic commerce community
- 11. National security community

12. Health community

SOURCE: GENERAL SERVICES ADMINISTRATION, WASHINGTON, O.

Through the activities of the socalled affinity groups, government will provide a consistent approach, according to Mike Corrigan, senior advisor for information resources management at the GSA and a member of the federal internetworking panel.

The affinity groups, such as the one called Government E-mail Users (see graphic), are currently being formed under the aegis of the Government Information Technology Services working group of the Clinton administration's Information Infrastructure Task Force.

Affinity groups, organized around specific tasks rather than specific data protocols, are being managed by senior Information Resources Manager (IRM) officials, such as Robert Woods, GSA's Federal Telecommunications System 2000 administrator, and Roger Cooper, Department of the Treasury IRM director.

"There will be a broad cross-agency group to provide a consistent approach," said Mike Coorigan, senior advisor at the GSA.

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Putting Technology To Work

digital

# IBM to move mainframes further into client/server

BY MICHAEL COONEY

IBM this week will announce products designed to simplify the integration of its new mainframes into enterprise client/server networks.

New products will include a System/390 Parallel Enterprise Server, a version of TCP/IP and LAN Resource Extension and

Services (LANRES) for VSE environments, a DCE-compliant version of VM, object-oriented application development tools based on C++ and System

Object Model (SOM) and Distributed SOM (DSOM), plus the ability to access existing CICS and IMS applications from any DCE-compatible device.

In the face of ebbing mainframe sales and the potential exclusion of the mainframe from users' future client/server plans, IBM is feverishly trying to add tools and features to its new generation of CMOS-based mainframes that will ensure their inclusion in the distributed applications world.

Since forming a client/server division in 1992, the company has been trying to reposition the mainframe as a server, but because of cost, lack of application development tools and other reasons, the pitch has largely fallen on deaf ears.

IBM executives said earlier this yearthat their greatest challenge is changing the perception that the mainframe environment, be it MVS, VM or VSE-based, is not open and cannot work well in a multivendor, distributed environment.

IBM hopes these announcements will change some opinions. The IBM S/390 Parallel Enterprise Server is positioned as an entry-level application server and as the first new CMOS-based mainframe that can run existing S/370 mainframe applications.

IBM has already announced two other

specialized parallel processing mainframes — the S/390 Parallel Transaction Server 9672 and Parallel Query Server (*NW*, April 4, page 87).

"Existing MVS customers can use it to support existing applications, or it can be used to build new parallel processing applications from scratch," said Bill Reedy, director of market operations in IBM's Large

Scale Computing division.

But are parallel processing mainframes really servers and not just repackaged hosts?

"IBM calls these processors

"MVS

customers

can use it

to support

existing

applications,

or it can be

used to build

new parallel

processing

applications

from scratch,"

Reedy said.

servers because they are devoted to one function, be it application, transaction processing or database serving," said Thomas Nolle, president of the CIMI Corp. consultancy in Voorhees, N.J.

"A true mainframe would perform all those functions at one time, making it much more complicated and expensive," he added.

All of IBM's new parallel processing mainframes are based on existing S/390 technology coupled with IBM-developed CMOS-based microprocessors.

Each unit houses a minimum of two microprocessors, 128M bytes of memory, three channel connections and one coupling link for connectivity to other parallel boxes.

### MULTIPROTOCOL HELP

To integrate the machines into multiprotocol environments, the company will announce TCP/IP for VSE. The VSE operating system, used primarily by small to midsize mainframe shops, is the last of IBM's mainframe operating systems, which include MVS and VM, to get TCP/IP support.

It is also last in line to get LANRES support. LANRES lets users employ VSE-based mainframes as large servers for Novell, Inc. NetWare LANs. "VSE users can now deploy their mainframes in the multiprotocol LAN world and gain access to TCP/IP host resources," Reedy said.

IBM will also announce a Distributed Computing Environment-compliant version of its VM operating system — OpenEdition for VM. OpenEdition is the name for IBM's DCE products. Adding DCE support to VM will let users link mainframes with other IBM DCE-compliant platforms, such as Application System/400, MVS and AIX.

The key, however, to getting users to deploy mainframes as servers, whether they are existing boxes or new parallel processors, is to get applications written to take advantage of them.

IBM's new OpenEdition DCE for MVS

will let DCE users access existing CICS or IMS applications from anywhere in the enterprise, fulfilling a promise the company made earlier this year (NW, March 7, page 1).

The program runs in with MVS Version 5 Release 1 and will eliminate the daunting task of having to rewrite existing applications because the program will translate DCE remote procedure calls into a format CICS and IMS applications understand.

IBM will also announce that it will bring its SOM and DSOM object-oriented devel-

opment environment to the mainframe world. SOM lets users develop object class libraries and programs. DSOM is the object request broker for SOM and lets users or third-party developers build distributed object-oriented applications across multivendor platforms.

"We are moving quickly to get as much object-oriented programming support into the mainframe environment because it's easier and faster to bring new applications to market," Reedy said.

Oracle plots wide ties to network management tools

BY BARB COLE

Redwood Shores, Calif.

Oracle Corp. will announce this week that it is working with key net software providers to let Oracle databases be administered from a variety of management platforms, and next month is expected to roll out an agent for centrally managing distributed databases.

As part of its Systems Management Tools Initiative (SMTI), Oracle will form alliances with about 15 vendors, including Banyan Systems, Inc., Cheyenne Software, Inc., IBM and SunSoft, Inc. to create links between Oracle 7 and net management products.

Also at NetWorld+Interop, Oracle will announce Oracle in Motion, a set of tools that will let mobile workers access existing databases (NW, Sept. 5, page 29). In addition, the company will announce that it is teaming with Compaq Computer Corp., Eicon Technology Corp., Intel Corp., Novell Inc. and SynOptics Communications, Inc. to develop turnkey systems that include hardware, networking and databases.

Oracle said the SMTI project will help customers manage distributed databases and determine how much network traffic is linked to Oracle databases.

"Many of our customers are deploying databases across the enterprise. Once the systems are installed, bottlenecks appear. Now you'll be able to use these [management] products to fix those bottlenecks," said Mark Hartstein, product manager for database administration tools at Oracle.

Typically, database problems can be spotted, but not fixed, from third-party management systems. Oracle currently bundles Oracle Network Manager with its Oracle 7 databases, but the tool is limited.

Oracle said it will continue to include Network Manager with its database and work to enhance it through the alliances. The company will give the SMTI firms a two-year head start on Oracle7 feature enhancements. The goal is to have simultaneous releases of Oracle databases and network management tools that support new features, Oracle said.

Network management products that include links to Oracle should be available by the end of this year.

### TME AGENT

Oracle is also expected to announce next month at its International Oracle Users Group meeting in San Francisco that it will develop an agent for Tivoli Systems, Inc.'s Tivoli Management Environment (TME), which manages net devices, systems, databases and applications.

The agent, which sources said will be available by the first quarter of 1995, will let TME users monitor distributed Oracle databases from a central point. TME is an object-based management system that processes events and invokes automated operations.

In the last month, rivals Sybase, Inc. and Informix Software, Inc. have announced they will develop their own software tools based on TME.

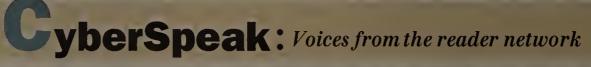
Oracle would not comment on the agent.

Susan Hoelig, a Unix administrator at Moore Business Forms, Ltd. in Grand Island, N.Y., became heavily involved with networking issues when she recently moved a mainframe application to Oracle.

"We don't have a good net management tool here that works with Oracle. We looked at Netview, but that didn't have a link to the database," Hoelig said.

"When I was running NetWare, I found the monitoring capabilities very helpful. But that's just not there in Unix," said Mike Fisher, database manager at Medical Interinsurance Exchange in Lawrenceville, N.J. "Being able to determine how much system memory is taken up by a process is really useful."

© Oracle: (415) 506-7000.



How do you think the acquisition of WilTel by LDDS will affect the longdistance telephone industry?

♦ "This has me very worried. Who is this LDDS? I've been a very satisfied WilTel user for many years and couldn't even spell LDDS until I heard about the acquisition.

"WilTel hasn't told me anything about what I should expect."

William Coopman, manager of telecommunications, Deere & Co., Moline, III.

◆"The WilTel/LDDS combination will create a fourth viable long-distance carrier that will help round out competition.

"AT&T and other carriers will pause before their raising rates, what with more alternative carriers who might not follow suit"

Bob Wallquist, vice president of regulatory affairs, Tele-Communications Association, Inc.

◆"The formation of a larger long-distance company will help keep rates stable, or perhaps even lower them. This is one industry that could certainly use more competition — especially outside of the existing

Big Three.

"The newly merged WilTel/LDDS combination will be able to bring some much needed clout and, hopefully, fresh ideas to a stuffy, established market."

Ed Vaughn, communications specialist, U.S. Postal Service, Raleigh, N.C.

◆"It is going to decrease WilTel's influence in the marketplace, and you are going to see a new player."

Howard Richter, Industrial Computer Corp., Atlanta



What was the best thing you saw at NetWorld+Interop this week?

Responses due by 8 p.m. Thursday, Sept. 8. You'll get a T-shirt if we print your response. Please include your name, company and address.

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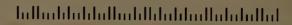
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# **GSA** lifts software buying limits for gov't agencies

BY ELLEN MESSMER

Washington, D.C.

Bowing to pressure from users and industry, the General Services Administration last week lifted a software buying limit it had imposed on federal agencies that buy products off GSA contract lists.

Joe Thompson, GSA information resources

management service commissioner, said the agency has rescinded the eight-copy-per-order buying limit on the thousands of different software products available under the GSA list called the Multiple Awards Schedule.

Government MIS directors last week commended the GSA on its action, saying the limit - which covered key network software like

Novell, Inc.'s NetWare, Lotus Development Corp.'s Notes and other applications — had created obstacles that prevented agencies from getting the software they needed.

The GSA had imposed the limit last April as a way to nudge agencies toward greater reliance on site licenses rather than individual shrink-wrap purchases.

But agency MIS directors who have to answer to thousands of computer users at multiple sites across the country found the rules overly restrictive.

"It was difficult to use the [Multiple Awards Schedule as written, so people unfamiliar

with it had trouble," said Renato DiPentima, deputy commissioner for systems at the Social Security Administration.

Government MIS directors resented having restrictions imposed on them that are not found in the private sector, DiPentima added.

Not surprisingly, the buying limitation also rankled vendors, who voiced their disapproval through the Information Technology Association of America (ITAA) and the Business Software Alliance (BSA) trade groups.

Last week, the Federal Information Technology Acquisition Improvement Team, a Clinton administration task force composed of MIS directors from a dozen agencies, issued a report criticizing the GSA's software buying limit. The GSA's Thompson responded quickly by immediately lifting the eight-copy

"We made a mistake," Thompson said candidly last week. "We fell short in the customer service area with the agencies.

"GSA is living up to its policy of open communications between us and industry," responded DiPentima.

Trade groups BSA and ITAA also expressed approval of the GSA decision lifting the purchase restrictions.

# Cascade adds **T-1 ATM module** to 9000 switch

BY MICHAEL CSENGER

Cascade Communications Corp. last week announced a T-1 Asynchronous Transfer Mode module that provides the first ATM-based userto-network interfaces for its B-STDX 9000 broadband switch.

Until now, the 9000 supported only 45M bit/sec ATM trunks between switches, but the new eight-port T1 ATM IO Module accepts ATM user traffic at 1.5M bit/sec T-1 speed. It provides local switching among the eight user ports, while traffic bound across the network gets forwarded to the 9000's higher speed

Many users have long demanded T-1 ATM services - public and private - as an alternative to costlier T-3 ATM.

BellSouth Corp. intends to use the T-1 ATM module that the 35-node network of Cascade 9000 switches employs to provide public ATM service, the tariff for which takes

effect this week (see story, page 4).
"We've had a lot of demand for ATM at lower speed," said Ken Hawkins, BellSouth's broadband data services product manager.

"But this is just a lead-in to a bigger story," Hawkins said, referring to Cascade's and Bell-South's ATM plans. "We expect to use the [Cascade] 9000 to provide a host of ATM solutions, and with the addition of other interfaces, it's oing to be a valuable platform for us." He declined to elaborate.

### **CASCADING DESIGN**

The 9000's design includes integral ATM, frame relay and Switched Multimegabit Data Service interworking. This allows frame relay or SMDS traffic to be carried over the network and emerge at the final node as a T-1 ATM cell stream, or vice versa.

Cascade also distributes its switching fabric See Cascade, page 12



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Circle Reader Service #72

# Proteon goes full tilt with suite of Ethernet offerings

BY SKIP MACASKILL

Proteon, Inc. this week is expected to broaden its assault on the Ethernet market with a product splash that includes new network interface cards (NIC), hubs and switches.

While the company currently offers Ethernet interfaces for its multiprotocol router and chassis-based hub lines, this rollout marks the first time Proteon - which is primarily a token-ring company — will offer stand-alone Ethernet hubs and switches, as well as NICs.

The new line will allow it to compete headon for the first time in the highly competitive Ethernet space.

Sources close to Proteon said the company is reacting to user demand and trying to provide its sales channels with a wider line of products. Ethernet offerings could also help the financially struggling company generate

"Proteon has come to the realization that man does not live by 802.5 alone," said one source. "With Ethernet switching especially gaining such momentum, the company believed it had to expand the mission of its LAN products division and take advantage of that opportunity."

### **Big Ethernet push**

Proteon is expected to announce the following Ethernet products at NetWorld+Interop:

- 16-port switch with optional FDDI uplinks
- 8-port switch
- ✓ 8-port 10Base-T hub
- 12-port 10Base-T hub
- 12-port 10Base-T hub
- Full suite of NICs supporting PCMCIA, ISA, EISA and PCI bus types

GRAPHIC BY TERRI MITCHELL

Proteon has apparently entered into several partnerships with established Ethernet vendors for some of the needed technology and plans to extend those alliances into joint development agreements in the near future.

Proteon officials declined to comment, but sources familiar with the company's plans said the following products will be unveiled this week at the NetWorld+Interop trade show:

- A 16-port Ethernet switch with two optional Fiber Distributed Data Interface slots for highspeed connections to servers or fiber-based backbones. The device will also support bridging capabilities to filter traffic and build fire walls against bad packets.
- An eight-port Ethernet switch that provides the same features as its 16-port brother, but without the optional FDDI connections.
- A 12-port 10Base-T stackable hub that supports BNC and attachment unit interface connections. As many as 15 of these devices can be stacked together and managed as a single logical repeater supporting 168 nodes.

A second version comes complete with a built-in Simple Network Management Protocol agent and a Windows-based software configuration tool.

An eight-port 10Base-T workgroup hub that

is designed to connect isolated workgroups and provide access to larger Ethernet LANs through a BNC or 10Base-T backbone connec-

A full line of Ethernet NICs that support PCMCIA, Industry Standard Architecture (ISA), Extended ISA and Peripheral Component Interconnection bus types.

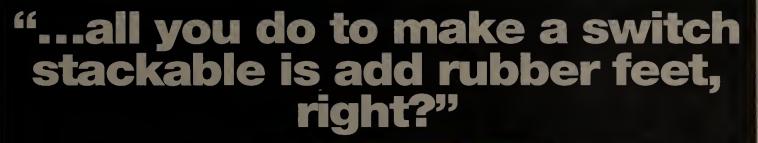
The switches range in price from \$3,800 to \$9,500, while the hubs cost between \$300 and \$1,200. The adapters cost from \$70 to \$350. All products are expected to be available next

"Very few of Proteon's customer sites are solely token-ring shops, so a complete Ethernet line allows Proteon to better support those users," explained Jennifer Pigg, program manager for data communications at The Yankee Group, a consultancy based in Boston. "The company is not so delusional as to believe it can become a major force in the Ethernet market. It's simply trying to complement what it

already has with what its users are asking for."

The fact that Proteon already has established sales channels and reseller deals for its token-ring products will help the company move its new line, but some channel conflicts may emerge, Pigg cautioned.

'Proteon's existing channels and resellers give it an advantage in getting Ethernet devices into the market, but if one of its current resellers is pushing Proteon token-ring solutions with 3Com Ethernet offerings, will they drop 3Com for Proteon?" she asked. "That will likely depend to some degree on whose Ethernet technology Proteon is relying on."





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Circle Reader Service #32



# Cheyenne readies hierarchical backup for NetWare servers

**BY PEGGY WATT** 

Roslyn Heights, N.Y.

Hierarchical file

system duties

Distribute backups

Insert pointers so

users can easily

retrieve files

Support multiple

Enable users to

media at different backup levels

get most active files more quickly

across the

enterprise

Cheyenne Software, Inc. will soon take the continuous, live backup of network files to a new level with the release of the Cheyenne Hierarchical Storage Manager (HSM), an automated system for NetWare servers, announced this week.

The hierarchical storage system is designed to work with Cheyenne's ARCServe products to perform high-speed backups across the enterprise, storing files on tape, optical disc or hard drives. The system deter-

mines where to store data based on the file type, usage, age and other factors set by the administrator and can even store them to specific subdirectories, said Bennett Klein, Cheyenne's product manager of mass storage.

Users can retrieve files stored on backup media using no additional commands because Cheyenne HSM tracks file distribution with pointers to their new storage site. Although the process may take longer, it uses considera-

bly less time than having to ask a system administrator to get it, Klein added.

"The key benefit is that instead of deleting or grooming files, they are moved down to a medium you may use today for backup," he said. "But the users

still have access, and they don't have to worry about where the data is because it appears as if it's on the medium where it was originally stored."

Typically, hierarchical management systems keep current data on the server's hard disk drive and move less frequently used files to a rewritable optical device and the oldest files to a tape drive.

### **USERS' VIEW**

Users said Cheyenne HSM sounded good, especially if it builds on their existing backup system.

'We're looking for some means of archiving files and migrating data off the LAN but still be able to get at them," said Brian Carlson, network manager at J-Star Industries, Inc. in Fort Atkinson, Wis.

His NetWare LAN now has 2G bytes of hard-disk storage, but much of it is taken up by engineering drawings for which he's considering optical storage. "The CAD drawings may not get touched for a year or two at a time, and then we'll get an order and have to retrieve one," he said.

Another Cheyenne user, Ben Rothke, network computing manager for Track Data Corp. in New York, maintains 15G bytes of storage for 300 users. He manually moves less frequently used files to tape and is looking for more storage options.

"There's so much data out there, it's impossible to keep it all [on the hard drive]," he said. "It's like having your in-box and filing cabinets - you can't keep everything on your desk."

Rothke said a 15- to 30-second retrieval time for lesser used files stored on optical drives or tapes would be acceptable. "You don't always need an See Cheyenne, page 130

# Start-up offers new tools to do business on Internet

BY ELLEN MESSMER

Mountain View, Calif.

Start-up Mosaic Communications Corp. this week announced two types of Mosaic server software that will help companies sell products and services on the Internet.

One version of the Mosaic NetSite Communications Server lets organizations present multimedia information to the public over the Internet without security features. The NetSite Commerce Server version adds encryption and authentication features to provide for secure business transactions.

Both versions can operate at lower speeds than the original Mosaic soft-

"Our first server is designed for people who want to post literature such as catalogs or research documents, which need not be encrypted," said Paul Koontz, vice president of marketing at Mosaic Communications.

The secured version incorporates RSA Data Security, Inc.'s public-key encryption technology so that both buyers and sellers of Mosaic-advertised products and services can exchange sensitive information, such as credit card numbers, over the Internet in confidence.

The Mosaic advertiser Mosaic Communications Chairman and CEO and buyers could validate James Clark (left) and Marc Andreessen each other's identities by

means of the public key's authentication feature.

Start-up Mosaic Communications has on its team Marc Andreessen, the creator of the original Mosaic research prototype developed at the University of Illinois' National Center for Supercomputing Applications.

Andreessen said Mosaic Communications software improves on the original because it can handle image trans-

NetScape runs on Windows and Macintosh and X Window System operating systems. Mosaic Communications is still investigating the means for distributing NetScape. The firm is involved in negotiations with a number of undisclosed computer vendors and resellers in the hope of seeing NetScape bundled into vendor hardware and soft-

fers at speeds as low as 14.4K bit/sec.

The original Mosaic, now under master license to Spyglass, Inc., is recommended for use at 56K bit/sec or higher.

The original also does not include secu-

sion also permits continuous document

streaming so users can view pages even

as they are being downloaded. It also

supports multiple downloading of sev-

eral documents simultaneously. These

two features are not included in the

Communications NetSite server will

work with any Mosaic client software

available commercially or downloaded

off the Internet as copyrighted free-

ware. But to take advantage of the secu-

rity features in the NetSite Commerce

Server, users need Mosaic Communica-

tions' client software, NetScape.

Koontz said the nonsecured Mosaic

The Mosaic Communications ver-

rity features.

original Mosaic.

The daily newspaper San Jose Mercury News will be setting up a Mosaic Communications server this fall, posting the publication's contents on-line. The company may take advertising to support the Mosaic operation, said Barry Parr, product manager for the newspaper.

"We're now working on the business model, and we're trying to figure out the marketplace," Parr said. "We will put up a certain amount of information free, even if there is no advertising

The current thinking is to use the Mosaic server as a platform for selling the newspapers' archives, Parr said, adding that a similar service available through America On-Line has been successful.

The Mosaic NetSite Communications Server, priced at \$5,000, will be available next month. The Mosaic Net-Site Commerce Server, which costs \$25,000, will be available in November.

OMosaic Communications: (415) 254-1900.

### Cascade

Continued from page 10

and traffic management among all modules on the 9000, rather than using a single, large switching matrix.

The modules are connected to one another over a 1.2G bit/sec backplane bus, and each module is controlled by its own Intel i960 Reduced Instruction Set Computing processor.

This provides more efficient use of switching resources, according to Steve Kelly, Cascade's manager of product marketing.

"Switching happens on the cards, and each port consumes only as much bandwidth over the bus as it alone needs," Kelly said. "This lets us aggregate a lot of low-speed traffic because we're not tying up a 155M-bit switch port to carry a single T-1."

The T-1 ATM module also carries 4M bytes of memory for traffic buffers, with each card's buffer management handled independently by the onboard controller. Buffer space is shared equally among all active ports — if only one port is active at any time, it can access all 4M bytes.

Variable bit rate (VBR) ATM traffic is buffered according to three levels of prioritization, while constant bit rate (CBR) traffic is passed through a highest priority, no-delay queue.

These priority levels provide flexible class-of-service provisioning while helping to prevent congestion on the network, Kelly said.

Cascade's class of service appears more limited than some other vendors' schemes. StrataCom, Inc., for example, provides a choice of 32 classes of service for each virtual circuit.

''That kind of granularity really isn't necessary," said Frank Dzubeck, president of Communications Network Architects, Inc., a consultancy in Washington, D.C. Running CBR as its own class of service and then providing three classes of VBR should meet all needs, he added.

### **DIMINISHING RETURNS**

According to Thomas Nolle, president of the CIMI Corp. consultancy in Voorhees, N.J., network models he has created also suggest that prioritization hits a point of diminishing returns after

"Your ability to manage events and refine bandwidth becomes more precise than the link speeds can tolerate," Nolle said. "The only time you run into problems is when you start giving everybody top priority. Then you get enough congestion to create delays that start to blow the constant bit-rate traf-

The T1 ATM IO Module will be demonstrated at NetWorld+Interop in Atlanta this week, along with the ADC Kentrox ATM Access Concentrator as a T-1 ATM feeder.

The module will be available in the first quarter of next year for \$32,000.

©Cascade: (508) 692-2600.



Product: T1 ATM IO Module

Company: Cascade Communications Corp.

- Provides 8 T-1 ATM ports for low-speed ATM services, public and private, on Cascade's B-STDX
- Provides local

considered low at \$4,000, it is not yet cheap. Greater port density at lower cost is still required.

The user view: [B-STDX] 9000 was optimized for lowspeed connections, particularly of frame relay. But I think you'll see that Cascade intends to make it a very capable ATM switch - it was designed to migrate that way. 77

Ken Hawkins



The benefits:

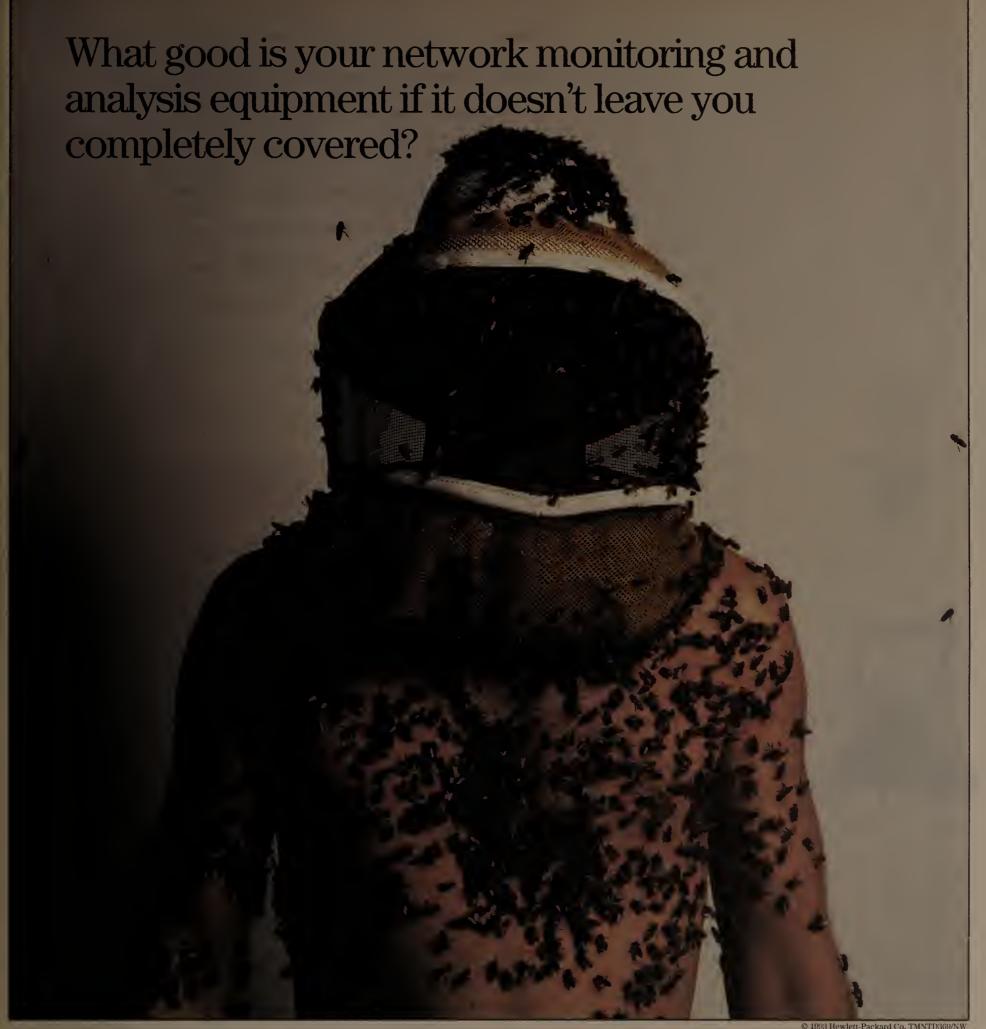
- 9000 switch.
- Interworks with frame relay and SMDS.
- switching.

### The drawbacks:

While cost per port is

**Paui Koontz** 





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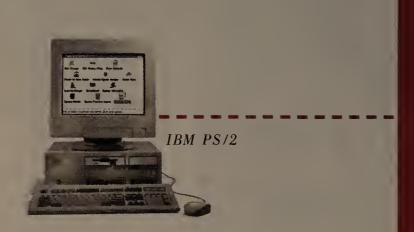
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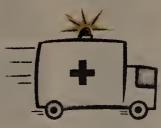
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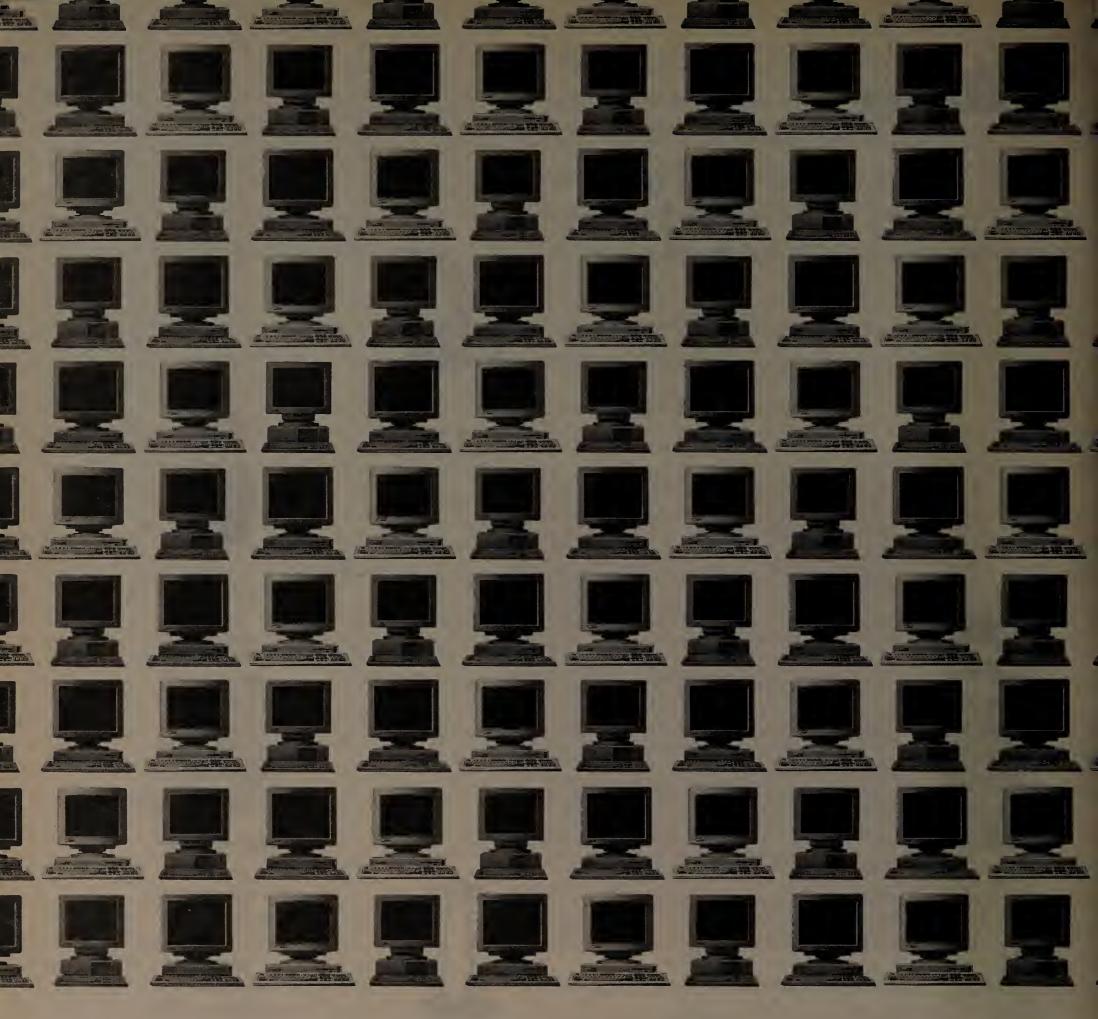
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and by System Profile Service
in a DB2/2" database.



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warnings automatically.

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and NetView/6000.





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05 ☐ Hospitality/Entertainment/ Recreation 06 ☐ Media/TV/Cable/Radio/Print	16. ☐ Carriers/Interconnects  17 ☐ Manufacturers (Computer/ Communications)	2.	2
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# ENTERPRISE INTERNETS

Data Network Architectures, Standards, Equipment and Management

# **LEGENT** intros enhanced trouble-ticketing system

BY JIM DUFFY

LEGENT Corp. last week announced a new version of its Paradigm/XP trouble-ticketing application that allows users to manage a wider array of systems, access additional databases and use the software from more management platforms.

Paradigm/XP manages information on system problems reported through network management platforms, users and service desk personnel. It launches a trouble ticket describing the problem, and routes or escalates the

trouble ticket to the appropriate service attendant. It currently runs on Sun Microsystems, Inc.'s SunOS, Hewlett-Packard Co.'s HP-UX and Microsoft Corp.'s Windows platforms, and works with Sun's SunNet Manager and HP's OpenView management systems.

The new version of Paradigm/XP, Release 2.10, is integrated with LEGENT's XPErtware middleware, allows applications utilizing various protocols and running on a variety of hardware platforms to access the Par-

adigm/XP system. This integration allows users to tightly couple Paradigm/XP to LEGENT systems management applications, or to third-party applications that run on IBM

MVS, VSE and AIX, Sun Solaris, OS/2 and Windows NT platforms.

The LEGENT software can also run on a range of new client and server platforms, including AIX, Solaris and Novell, Inc. Unix-Ware servers, and other clients that emulate Digital Equipment Corp. VT-100 terminals. LEGENT added a character user interface to Paradigm/XP 2.10 that translates the application's graphical interface data into a characterbased format for VT-100 terminal emulators.

"We're bold enough to think we're the standard problem management system for enter-

prise networks," said Randy Boroughs, LE-**GENT** senior product manager. "We think we've got 'er covered.''

Meanwhile, Paradigm/XP 2.10 also supports Oracle and Informix relational databases, so users can store and retrieve trouble-ticketing information, such as system inventory and service history, from four leading databases. Paradigm/XP already supports Ingres and Sybase, Inc. databases.

Additionally, Paradigm/XP 2.10 can run on Cabletron Systems,

Inc.'s Spectrum and IBM's NetView/6000 management platforms, as well as Novell's See LEGENT, page 30

### Presto: Frames turn into cells Presticom BCX-6000 1. Protocol Sorter accepts incoming data and separates SNA from LAN traffic. TCP/IP fragmentation and data compression WAN cell SNA 1 2. Frames are Programmable Variable Cell Relay Protocol Sorter fragmented into 48-character cells LLC-2 and compressed. 3. Programmable Variable Cell Relay SNA fragmentation process assigns a priority to each cell, based on predefined user criteria. GRAPHIC BY TERRI MITCHELL SOURCE: PRESTICOM, INC., SAINT-HUBERT, QUEBEC

# **Presticom to deliver SNA** traffic from branch offices

BY MICHAEL COONEY

Saint-Hubert, Quebec

Promising high-speed, priority delivery of SNA traffic from branch offices, Presticom, Inc. this week will add a frame relay interface to its BCX-6000 multiprotocol bridge/router.

The Presticom BCX-6000 uses cell-based technology, data compression techniques and a homegrown prioritization scheme to ensure the timely delivery of Systems Network Architecture and multiprotocol LAN

data in enterprise nets.

"The frame relay support will let users build consolidated multiprotocol networks more easily," said Gaston Poire', vice president of Presticom. "Combining frame relay support with our data compression and cell-based technology should improve throughput by 30% from the branch office to the corporate backbone while saving at least one-third in telecommunications costs."

The branch office routing market has exploded this year, with vendors such as Cisco Systems, Inc., 3Com Corp., Hypercom, Inc., Eicon Technology Corp. and Northern Telecom, Inc., making it the fastest growing market segment in the router industry, analysts said.

What makes the BCX-6000 stand out from the crowd is its prioritization scheme and cell-

based technology, analysts said.

It begins with the BCX-6000's Protocol Sorter, which looks at incoming datastreams and identifies each protocol in use. The sorter then assigns a "weight" to each protocol, based on user-defined criteria, and moves higher weight protocols to the front of the queue.

A fragmentation and data compression feature then takes over, breaking the data frames coming in from the Protocol Sorter into smaller 48-byte cells. The cells do not have to be full before passing onto the next process, Poire'

"Cell-based technologies offer a more efficient way of transporting data than packets or frames," said Lynn Nye, president of NetResults, a consultancy in Portland, Ore. "With the added support for frame relay, users can build meshed backbones that ensure reliable delivery of SNA and LAN-based protocols."

Under heavy traffic loads, the BCX-6000 uses a data compression algorithm that can shrink data and ensure faster throughput.

The feature was one of the chief reasons Ottoway Newspapers, Inc. chose to deploy BCX-6000s in its remote branch sites.

"We can now carry the [equivalent] of half a T-1 circuit over a 56K bit/sec line and 56K bit/sec of data over a 9.6K bit/sec line," said Patrick Carr, director of information services at Ottoway. "In addition, large file transfers that took 42 minutes in the past now take 11 minutes."

> The BCX-6000 includes a Programmable Variable Cell Relay feature that lets users set the ratio of high- and low-priority data. The product also recognizes SNA's own priority and class-of-service schemes.

A second BCX-6000 is required to complete the connection in most cases; though with the new frame relay interface, the BCX-6000 can link directly with any other device that complies with the Internet Engineering Task Force RFC 1490 specification. RFC 1490 defines how multivendor, multiprotocol devices connect over a frame relay net-

The BCX-6000 supports one token-ring or Ethernet LAN interface and as many as seven local serial ports for Synchronous Data Link Control, Binary Synchronous Communications, X.25 and other synchronous traffic. The box also supports SDLC-to-Logical Link Control 2 translation.

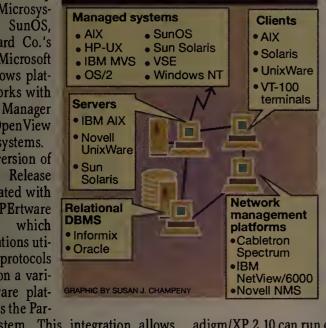
For wide-area connectivity, it offers between two and eight ports for leased or switched circuits operating at speeds from 1,200 bit/sec to T-1. In the eight-port configuration, the box can support a maximum of two

The BCX-6000 does not support a link to NetView, although it can be managed by any Simple Network Management Protocol-based platform.

The company also announced that it has joined the 1490 Market Development Group, which was unofficially launched last month by a group of SNA connectivity vendors to promote the use of frame relay to handle the mix of SNA and multiprotocol LAN traffic (NW, Aug.

Pricing for the BCX-6000 starts at \$10,000. The new frame relay interface will be included in new models.

©Presticom: (514) 443-2909.



**New features of** 

Paradigm/XP 2.10

# BRIEFS

CrossComm Corp. has announced it is developing a version of its Internetwork Management System (IMS) to run on IBM's NetView/6000 platform. IMS, which currently runs on Hewlett-Packard Co.'s Open-View for Windows, allows users to install, configure and monitor CrossComm routers.

The version of IMS for NetView/6000 will be available in first-quarter 1995.

CrossComm: (508) 481-4060.

Paralon Technologies, Inc. has shipped beta versions of its systems administration tool for its PathKey net security systems.

PathKey provides encryption for data transmissions over dial-up lines, plus hardware authentication and access control. It allows network managers to audit and print any PathKey programmed ID table, as well as search for, suspend, restore and permanently remove IDs. Users can also block unused

memory from unauthorized IDs and allow public dial-up access without compromising overall network security.

PathKey/SA costs \$450 and will be generally available at the end of September.

Paralon: (206) 641-8338.

Unison Software last week announced the availability of a new release of its Unixbased work load distribution software.

Load Balancer runs on Sun Microsystems, Inc.'s SunOS, Solaris, IBM AIX and Hewlett-Packard Co. HP-UX systems. It provides automatic queuing and distribution of jobs across heterogeneous Unix networks, which helps put idle computers to work while reducing the load on busy ones.

The new release of Load Balancer, Version 4.01, features a recovery mechanism that allows the software to remember what applications and programs were in process prior to a system failure.

Load Balancer 4.01 is available for \$895. Unison: (408) 245-3000.



# HAT DOES THE NEXT GENERATION WANT FROM US, ANYHOW?

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For starters, we've got the world's first evolvable ATM (Asynchronous Transfer Mode) technology: the AT&T GlobeView™-2000

All of which helps phone companies leap the formidable hurdles associated with broadband technology. And helps you get the new video dialtone services you've been hearing about.

So keep an eye out for interactive video, movies on demand and multimedia in your neighborhood.

Thanks to your local phone company and AT&T Network
Systems, you won't have to wait long.



## Motorola rolls out suite of access devices and ISDN/analog modem

BY MICHAEL CSENGER

Huntsville, Ala.

Motorola's Transmission Products Division today will introduce five new products that lower the cost of connecting to switched 56K bit/sec, ISDN, and full or fractional T-1

Motorola is focusing much of its product

development on ISDN, and one of today's announcements at NetWorld+Interop in Atlanta covers a unique hybrid device that combines an ISDN terminal adapter with an analog data/fax modem, said Michael Santiago, Motorola's product manager for LAN internetworking, based here.

"We want to basically own the ISDN mar-

Motorola's new digital access products				
Product	Features	The		
HMTA 200	ISDN Basic Rate Interface terminal adapter with NT-1, combined with standard data/fax modem.	Not decided, but less than \$895		
DM 170	Similar to HMTA 200, but supports switched 56K bit/sec services instead of ISDN BRI.	Not decided, but less than \$895		
UTA220	ISDN terminal adpater with integral NT-1, for videoconferencing or LAN-to-LAN connectivity. 2-port and 4-port models.	2-port: \$895 4-port: \$995		
FT100M	T-1 and fractional T-1 DSU/CSU with SNMP support.	\$2,695		
DDS/MR64	Motorola's "next-generation" leased-line DSU for up to 64K bit/sec digital services.	\$695		

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ket," Santiago said. "We're really betting on it, and this product is probably the most significant of the bunch.'

The Hybrid Modem TA 200 addresses an odd quirk of ISDN deployment. Users with ISDN access find they often have to maintain a separate analog line to communicate via modem with those not hooked up to ISDN.

So the HMTA 200 combines both ISDN and traditional analog modem connectivity in a single box. Incoming calls are automatically distinguished and handled as either an ISDN, modem or fax connection.

Software commands let outbound calls be directed over ISDN or analog services as needed. For example, a telecommuter could access the corporate LAN using 128K bit/sec ISDN connectivity, then send a fax or connect to an on-line service with a 14.4K bit/sec modem link.

According to Santiago, users do not need special service configurations from their carriers to support analog connections over a standard ISDN Basic Rate Interface link. "Anyone trying to reach you [by modem] just needs your phone number," he said. "That it happens to be an ISDN number is transparent to them."

When it ships in the fourth quarter this year, the HMTA 200 will include a 14.4K bit/sec V.32bis data/fax modem. At that time, Motorola will also announce pricing and availability for a 28.8K bit/sec V.34 upgrade. Santiago said the upgrade will involve opening the unit and replacing a daughterboard.

"As a product concept, I think this is just what the [ISDN] market needs," said Maribel Howard, analyst at International Data Corp., a market research firm in Framingham, Mass.

ISDN has started overcoming one hurdle simple deployment - and now faces the problem of interworking with other technologies, Howard said. "This box alleviates a lot of fears. It looks and sounds just like a modem when you need it to."

Users also see much potential for such a product, even if it does not fit exactly into their organization's business model. For example, the city of Omaha, Neb., uses ISDN as a leasedline service for LAN-to-LAN interworking the connection is simply left up constantly without connect-time charges.

"We're not calling anyone who's not on the network, so modem interworking is not an issue." said Mark Walker, the city's network systems coordinator. "But I think the product sounds great. It would really work for me at home, where I would love to use ISDN when I have to dial in to the network. Then I could still modem into CompuServe when I want to."

### **OTHER ACCESS WARES**

Motorola is also announcing four related products. The Digital Modem 170 is similar to the HMTA 200, but it connects to switched 56K bit/sec services rather than ISDN. Both ver-

See Motorola, page 25

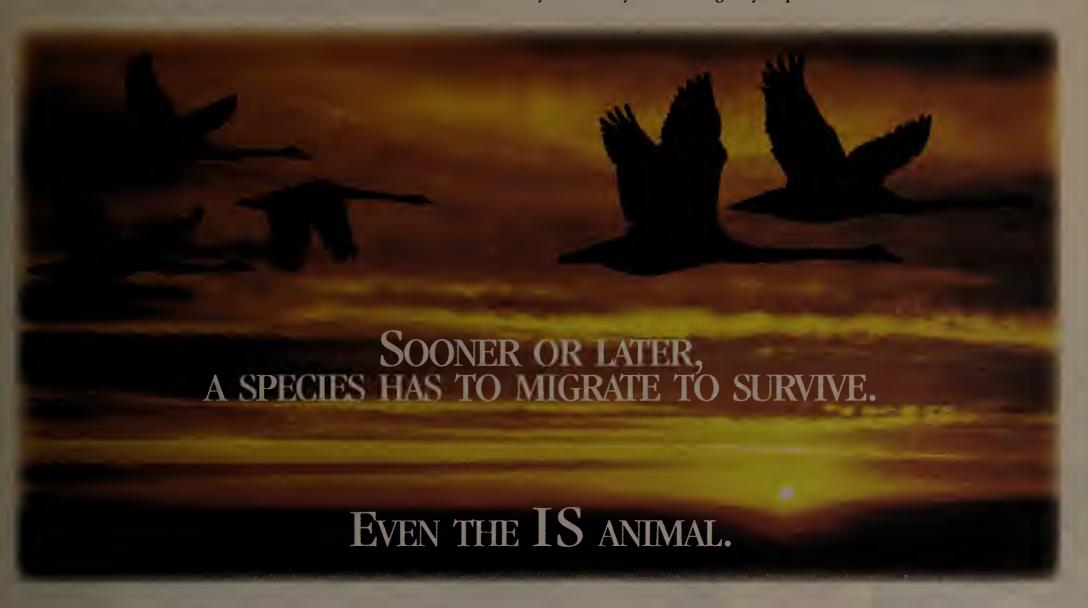
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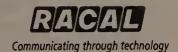
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### **NETWORK MANAGEMENT**

## Remote net devices set to debut at show

BY JIM DUFFY

Two network management firms will showcase their remote device monitoring wares at this week's NetWorld + Interop show here.

E-Comms, Inc. of Gig Harbor, Wash., will roll out E-Commander, a system that provides real-time monitoring and control of remote LAN and WAN devices from a single location. Meanwhile, MicroFrame, Inc. of Edison, N.J., will unwrap Segasys, a system that lets users remotely reboot network devices via a dial-up

### Remote control

- E-Comms' E-Commander:
- Provides a single agent and IP management address for multiple remote devices.
   Allows dial-up, out-of-band access to control ports on remote equipment.
- Cycles power among LAN/WAN hardware and enables sharing of diagnostic devices between LAN segments.

### MicroFrame's Segasys

- Attaches to maintenance port of remote
- Polls devices for status reports and
- Alerts technicians when devices do not
- respond to polls.
  Enables corrective action or reboot through maintenance port.

E-Commander comprises hardware and software modules with which a network administrator can control the operation of equipment dispersed throughout an enterprise

### Motorola

Continued from page 20

sions will be available later this year priced at less than \$895.

Motorola is announcing a modernized 64K bit/sec digital service unit (DSU) that combines the functionality of several earlier products at less cost. Santiago said users previously had to purchase Motorola's MR1, MR56 and a clear-channel 64K bit/sec DSU to get 56/64K bit/sec connectivity.

That functionality has now been combined in a single unit, the Digital Data Service/MR64, priced at \$695 - \$300 less than the earlier product set.

Likewise, Motorola has combined an ISDN terminal adapter and NT-1 device in its UTA220, designed for corporate videoconferencing or LAN-to-LAN connectivity over ISDN BKI. Iwo- and four-port versions are available for \$895 and \$995, respectively. The combined NT-1 saves about \$100 off Motorola's earlier separate offerings.

Lastly, Motorola is announcing the FT100M, a full and fractional T-1 DSU/channel service unit that is Simple Network Management Protocol-compliant.

Priced at \$2,695, Motorola intends the FT100M DSU/CSU to be the market price leader, as competing products cost as much as

OMotorola: (800) 451-2369.

network. E-Commander can be accessed and controlled through E-Manager, a Windowsbased management console.

The E-Commander devices are housed in a 19-inch mounting rack, atop of which sits the E-Commander Control Module, which serves as a single Ethernet IP address for the E-Commander application modules that connect to and control remote devices.

The control module serves as a single Simple Network Management Protocol agent for the application modules and the devices they monitor. It contains a TCP/IP protocol stack and an SNMP Management Information Base (MIB), in addition to SNMP agent software.

The control module polls each of the application modules, which allows it to update its MIB and report status information back to the E-Manager console.

E-Comms is currently offering three application modules with E-Commander. They are E-Power, E-Cat-5 and E-Data.

E-Power offers six switchable power circuits for cycling power to remote LAN hubs, servers and routers, or environmental control equipment such as fans, pumps or air conditioners. E-Cat-5 allows users to share diagnostic equipment, such as LAN analyzers, across multiple segments, thereby saving the expense and labor of using multiple analyzers. E-Cat-5 individually switches up to 12 RJ-45 data circuits to one common port. Switching can be done from the E-Manager console.

E-Data switches up to seven RJ-232 ports to a common RS-232 port. This allows one modem to provide out-of-band access to the control ports of remote equipment, such as servers, routers, bridges and private branch exchanges.

Up to eight application modules can be stacked under one control module. E-Comms

See Net devices, page 29



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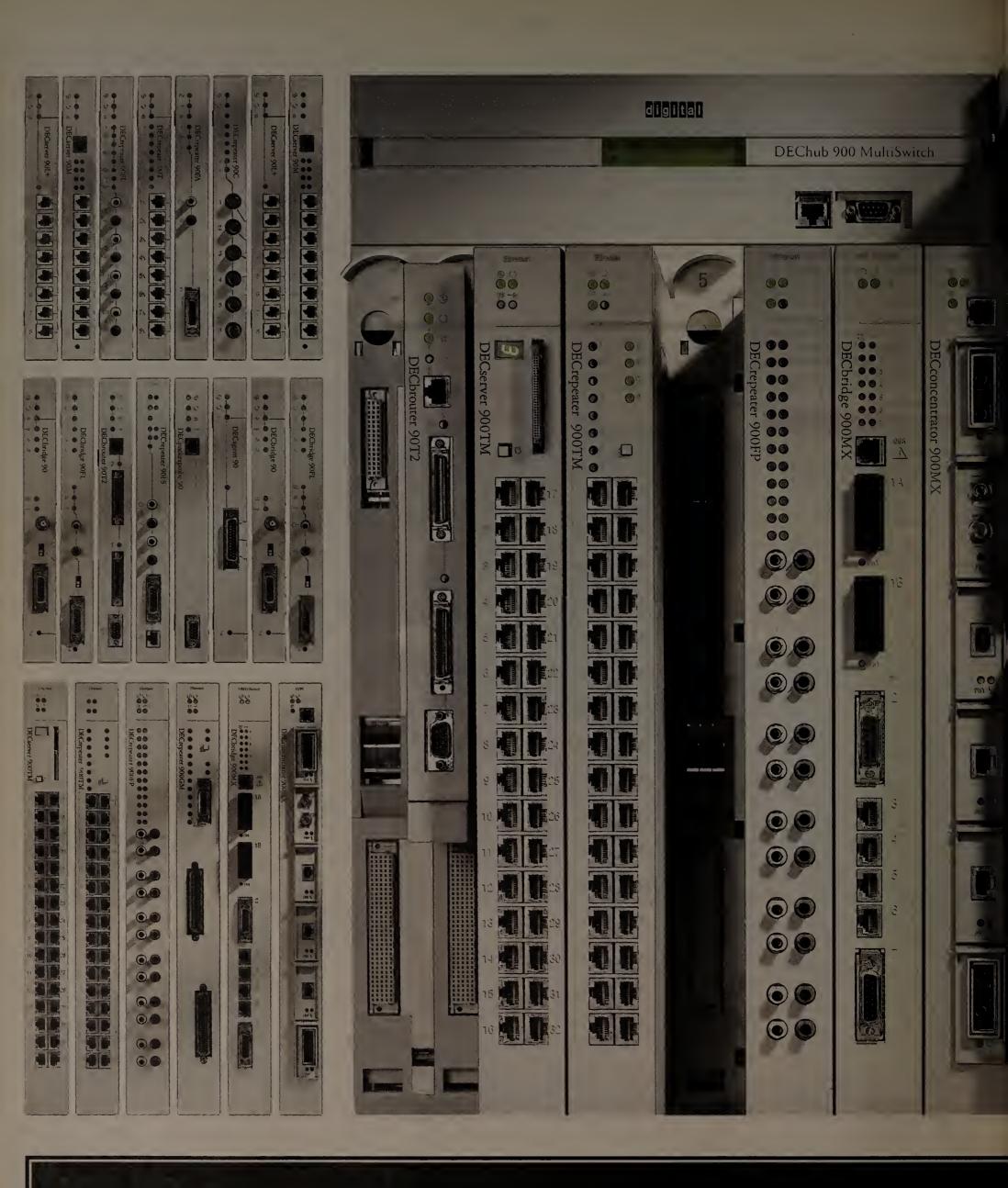
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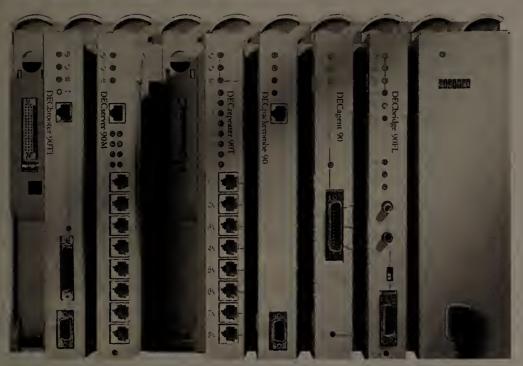


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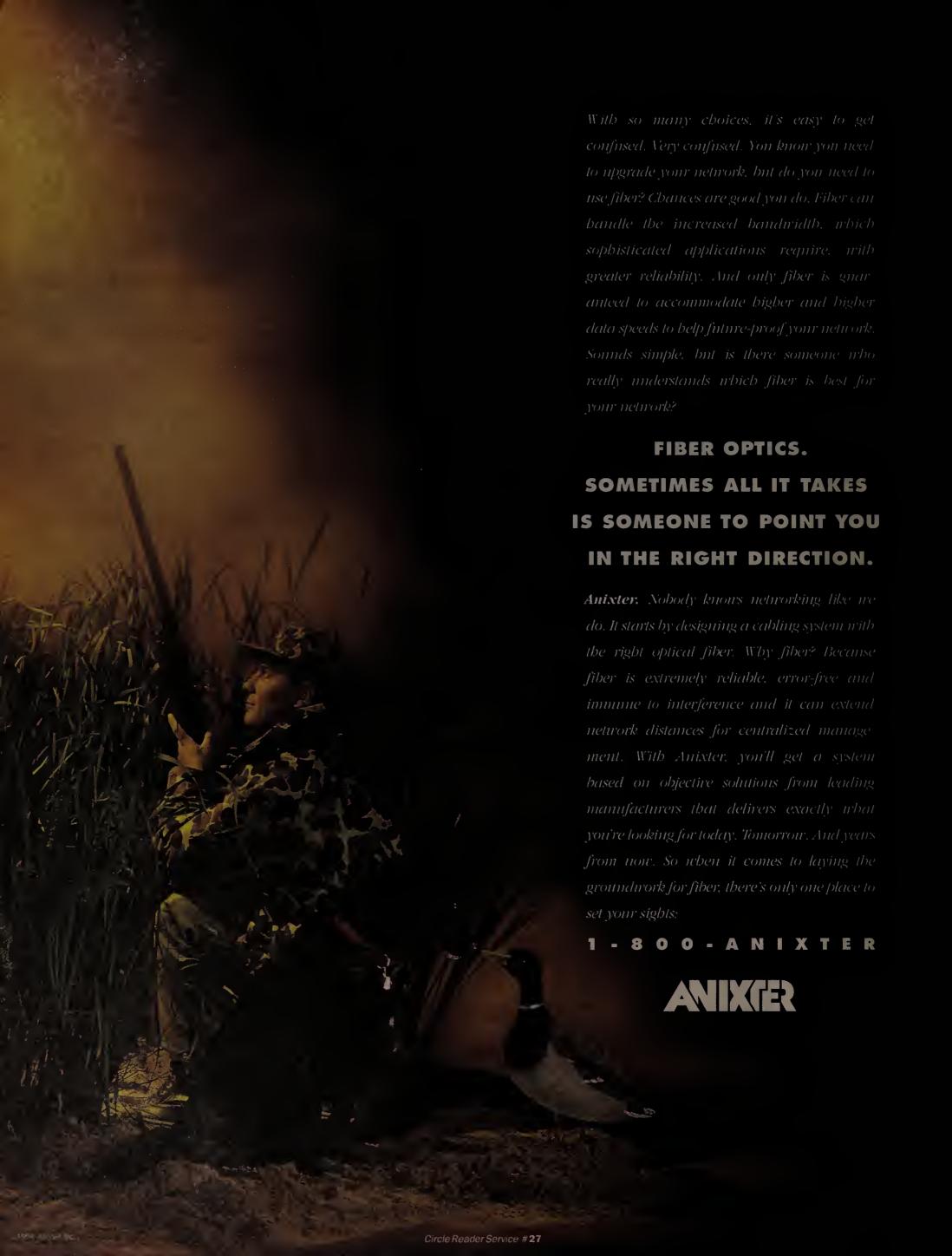
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# Magnalink squeezes Cisco router traffic

BY MICHAEL CSENGER

Atlanta

The Magnalink Communications Division of Telco Systems, Inc. today will announce a stand-alone data compression device designed for Cisco router networks.

The Series 500C LAN/WAN Optimizer uses compression algorithms licensed from Cisco Systems, Inc. Cisco recently added data compression to its software suite, with Release 10.0 of its Internetworking Operating System (IOS), and the 500C would be employed when users want to off-load that compression processing from the router.

"When the router is handling a lot of protocoltranslation, or simply routing a lot of traffic, you'll improve performance by handling compression with a separate box," said Stacy

Humphrey, Magnalink director of marketing.

The 500C provides 2-to-1 data compression at line speeds up to 128K bit/sec. So a 56K bit/sec leased line could provide effective throughput up to 112K bit/sec and would avoid the costs

"The question for compression hardware is not cost but whether the customer feels comfortable using any new product in the backbone."

associated with an upgrade to fractional T-1 services.

Designed for leased-line services, the 500C will not work with switched 56K services or 128K bit/sec ISDN.

The 500C can interoperate with Cisco routers directly, or can be paired with another 500C. For example, a central site Cisco router could be front-ended by a 500C, which then connects directly to another Cisco router at the remote site.

Or, if the remote router itself is burdened with lots of protocol translation, both routers could be front-ended.

Because the 500C uses Cisco's proprietary compression algorithms, it is not interoperable with other products, such as Magnalink's Series 5000 LAN/WAN Optimizer.

The 500C provides a single WAN port and a

### Net devices

Continued from page 25

said it will announce several other application modules later this year.

E-Commander costs \$3,500. The application modules cost \$1,095 for E-Power, \$1,595 for E-Cat-5 and \$1,095 for E-Data.

MicroFrame's Segasys, meanwhile, allows remote dial-up access to the maintenance port of any network device. Through polling, the system monitors the health of and remotely reboots network devices. It also provides alarming and status reporting.

If a device fails to respond to a poll, Segasys will alert a network technician by sending an alarm to the technician's pager. Once alerted, the technician can then issue corrective commands to the device's maintenance port or reboot the device.

Segasys is available now and costs \$24,900 for 10 concurrent users.

©E-Comms: (206) 857-3399; MicroFrame: (908) 494-4440.

single user, or router, port. In a central site application, each WAN link would require its own 500C at \$2,495 each.

Such hardware costs are easily justifiable, said Furya Panditi, Magnalink's vice president and general manager. "The economics are compelling when you look at the alternative monthly line costs.

"The question for compression hardware is not cost but whether the customer feels comfortable using any new product in the backbone," Panditi said. "A lot of users have been waiting for their backbone vendors to say 'Sure, go ahead,' and that is what makes this [agreement] so notable."

Experts agreed, adding that vendors' lack, until recently, of a clear commitment to data compression has held the technology back.

"There has been a lot of marketing voodoo, a lot of misunderstanding and fear," said Tom Lonergan, vice president of marketing for Prism Networks, Inc., a consultancy and networking software developer based in Waltham, Mass.

"When data is compressed, it enters a twilight zone where the routers and the users don't really know what goes on anymore," Lonergan said. "It's the first thing people start fingerpointing at when things go wrong."

But with IOS Release 10.0, "Cisco stepped up to the plate and took a stance," he said.

The 500C will be introduced and demonstrated at the NetWorld+Interop show here this week. It will be available in October for \$2.495.

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# Company ships connectivity software for mobile PC users

BY ELLEN MESSMER

Bothwell, Wash.

Traveling Software, Inc. last week began shipping Windows-based software that lets mobile computers connect to remote LANs and transfer files to a host PC over wireless and wire-line links.

LapLink for Windows supports more than 250 modems at up to 115K bit/sec between a host desktop PC and a laptop client. A data



compression feature called SpeedSync facilitates transfer of large files to a host PC from a remote site.

Users away from the office dialing in to transfer information such as inventory reports or price lists find this is expensive and time-consuming process using standard telephone lines or cellular links.

"Our customers told us that the [files] they

send are getting bigger, but remote transmission isn't getting any easier," said Mark Eppley, chairman and chief executive officer of Traveling Software.

To tackle the problem, Traveling Software developed its SpeedSync data compression technology, which Eppley said reduces the size of transferred files by as much as 8 to 1.

Trustmark Insurance Co., which betatested LapLink for Windows for remote access

Continued from page 17

NetWare Management System. This allows Paradigm/XP to share alarm and database information with management applications on those platforms, which means that an alarm can automatically invoke Paradigm/XP to generate a trouble ticket and populate it with system inventory data.

Other new features of Paradigm/XP 2.10 include a software developers' kit that allows users and developers to customize applications that work with Paradigm/XP; trouble-ticket templates, which allow managers to consistently implement problem reporting across the enterprise; and dynamic lists, which provide automatic routing of trouble tickets to the appropriate support staff member.

Also, Paradigm/XP 2.10 features real-time display updates, improved database performance and enhanced custom reporting capa-

"They've done a lot to improve the openness of [Paradigm/XP] by increasing the operating system platform and database support," said John McConnell, president of McConnell Consulting, Inc. in Boulder, Colo. "Beyond that, they have a lot of usability functions with dynamic lists and ticket templates. Those are the kinds of things that people need to get problem management automated."

Pricing for Paradigm/XP 2.10 starts at \$17,500. It will be available in the fourth quarter.

©LEGENT: (206) 688-2000.

to the company's token-ring NetWare 3.2 LAN,

found that the SpeedSync feature lived up to its billing. "This is a solid product," according to Ed Dombek, Trustmark's information cen-

The software supports a range of standards, including the V.fast modem standard and the

AT&T MNP-10 cellular modem spec. It also works with ISDN Basic Rate Interface lines, X.25 packet data services and National Semiconductor, Corp.'s AirShare radio module. AirShare uses shared, public radio bands to establish a wireless connection of up to 30 feet.

"It's very reliable in terms of data integrity," said beta user Mike Bianco, a member of the tech-

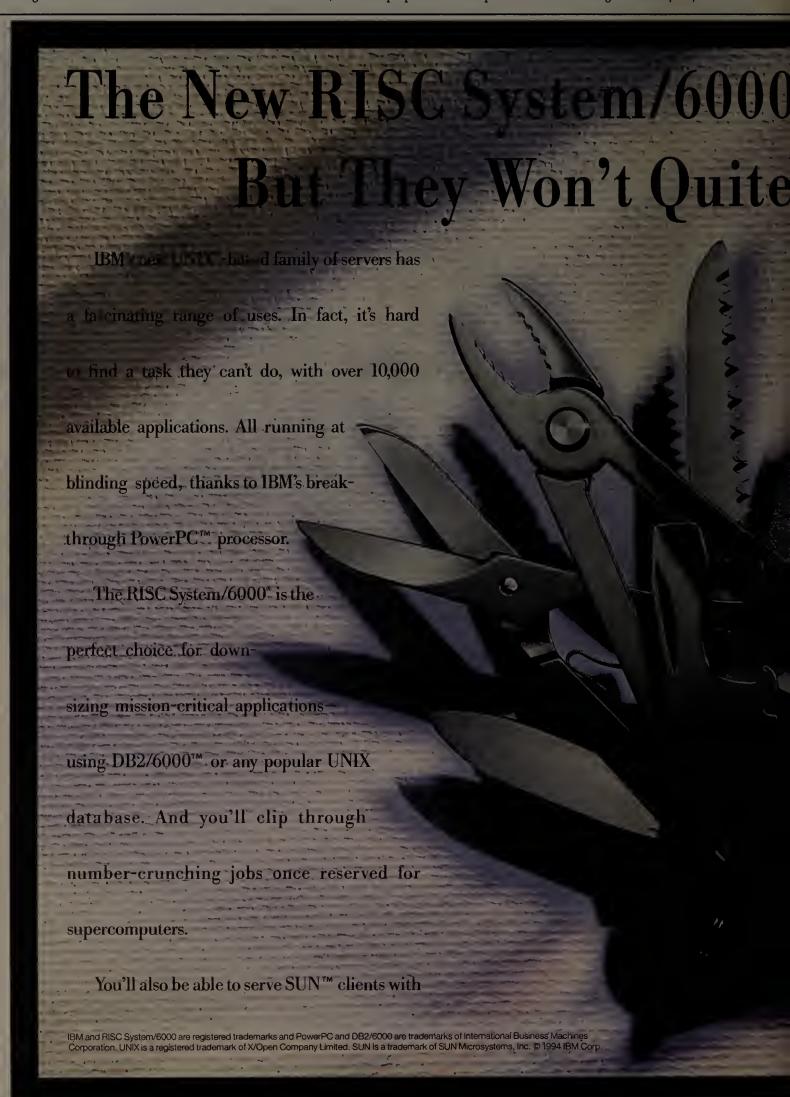
for Windows over AirShare. The product, which includes client and host software, lets the laptop or the desktop PC play either role as required. Both host and client PC must be a 386 PC or higher.

A "Chat" feature lets two users that are both running the product communicate interactively by typing back and forth.

The LapLink for Windows software, which comes with a PC serial and parallel cable, is currently selling through retailers at a cost of \$199.95.

Users of Traveling Software's earlier products, such as LapLink or CommWorks, can upgrade to LapLink for Windows for \$79.95 by calling (800) 765-2480.

©Traveling Software: (206) 483-8088.



by Ed Krol

# Will they ever catch the Internet fever abroad?

was fortunate enough this summer to travel to England and Japan to talk to people about the Internet and came back amazed at the similar state of the 'Net in each country and the views of natives toward it.

Both countries have large, formerly stateowned telephone companies that have a vir-

tual monopoly on dedicated data circuits. These recently privatized firms are making lots of plans having to do with the Internet but are not yet playing because they are not sure how selling Internet Protocol services will cut into their lucrative dedicated-line business.

On the other side of the fence, there are entrepreneurial companies that have taken advantage of the sluggishness of the big guys and started commercial Internet service companies. (They, of course, claim that a major factor preventing the rapid growth of the Internet is the high cost of dedicated circuits.)

In reality, there seem to be other factors at

work. First is the relative lack of computers in homes. Unscientific surveys of incoming freshmen at the University of Illinois indicate that more than 30% had computers at their disposal back home. A similar survey at the University of Manchester in England implies less than 10% did, a figure echoed by some Japanese acquaintances. Japan is teaming with microprocessors (just get into a cab and you'll see more electronics than in the average U.S.

police car), but they are employed as dedicated hardware in gadgets and not your run-of-the-mill PC.

The other big factor the two countries have in common is that local phone calls are all metered at a fairly high rate. Both cultures have this misconception that "all local calls are free in the U.S.,'



which promotes home use of the Internet in this country. I tried to debunk this, but couldn't deny their local call rates are much greater than any I am familiar with in the U.S. This leads to some interesting usage patterns. Demon, a low-end Internet access provider in the U.K., is easy to call into all day, but as soon as the rates change at 6 p.m., it's busy signals until late at night.

Now for the differences.

England's problem is infrastructure. I have friends who visited England about 10 years ago, and their first comment was "The phone system doesn't work." I found no problems with the voice side of the phone system today; they have done a great job of improving it. But there is not much happening on the data side. I got the impression the data circuit situation in England is akin to that in the U.S. in the 1980s, when if you wanted a high-speed data circuit outside of a major metropolitan area, it was hopelessly expensive.

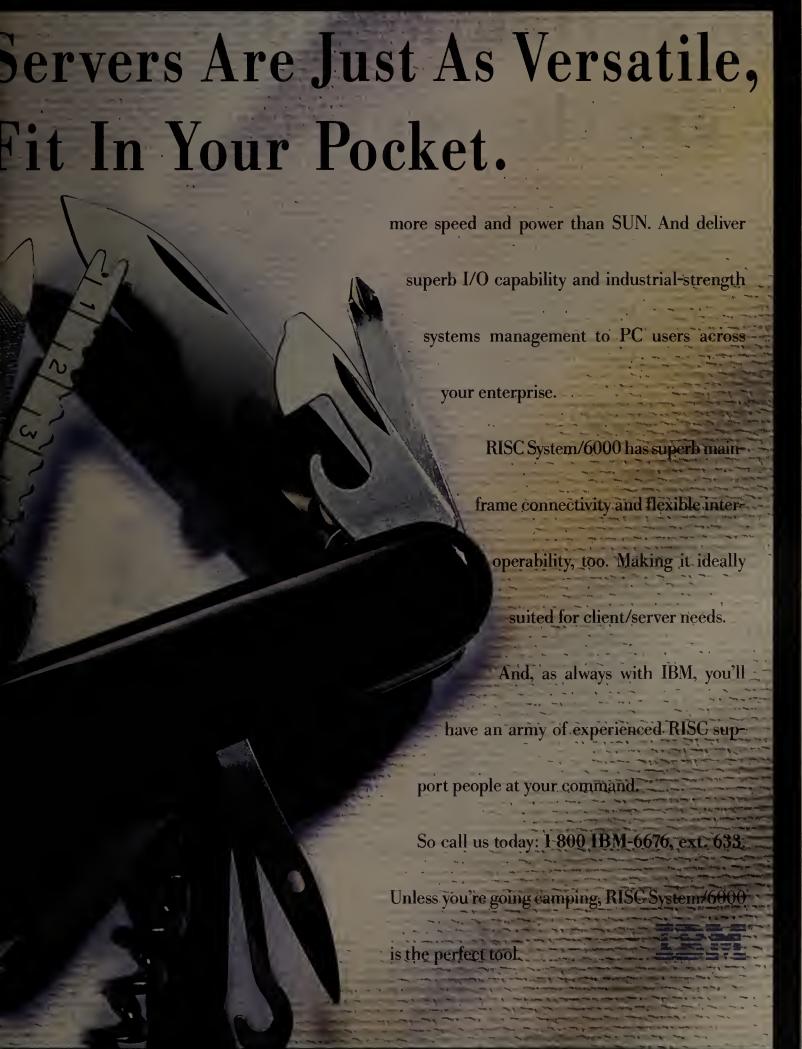
Japan, on the other hand, has invested heavily in infrastructure. The phone company was so far ahead of demand in installing ISDN that it takes a lot of heat for wasting money on it. If you are carrying a laptop with an ISDN card in it, you can tap into a phone at the airport or the Tokyo-Edo Museum and connect at 64K bit/sec. This tells me that once the Internet catches on in Japan, it will spread like wildfire.

Aside from the reasons already mentioned, I think the Internet has not caught on in Japan outside of the universities due to the lack of support for a Japanese character set. But that's changing. The Japanese are excited about the World-Wide Web because the new browsers support non-Roman characters. This, coupled with the existing infrastructure and the cultural love affair with technology, implies to me the Internet will take Japan very soon.

Now the biggest problem for the Japanese will be finding time to use the Internet. With two-hour train commutes being common and people working 10 hours in offices, it leaves little time to play on the computer at home. Wireless is probably not the answer, either, since the trains are so crowded that there is usually no lap for a laptop, but out of adversity, they will find a way.

Associates, Sebastopol, Calif., 2nd edition, 1994) and assistant director for network information services at the University of Illinois at Urbana-Champaign. He

→ Krol is author of The Whole Internet (O'Reilly &



can be reached at e-krol@uiuc.edu.

# LANNET WROTE THE book on switching hubs. Here are the reviews.

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"[LANNET] created a simple but ingenious feature that allows the switch to throttle back the source ports when the destination port is getting too much traffic." Data Communications

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Top Performer

"[LANNET] supplied the most data throughput of all the hubs we tested." LAN Times what they do in the pages of magazines is what they do

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# LAN WORLD

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#### INSIDE LAN WORLD

- Integrating TCP/IP into DOS and Windows environments. Page L2.
- Using touch-tone telephones as LAN clients: No longer just for the big guys. Page L4.
- Several vendors prep net analysis tools and test equipment for NetWorld+Interop. Page L6.
- Need to grow your network without adding maintenance staff? One company has found a way. Page L8.
- Training pays big dividends, and new options make it more palatable. Page L8.
- Multimedia ingredients are available, but the stew isn't fully cooked yet. Page L10.
- NetWorld+Interop will feature a range of new offerings and enhancements. Page L14.
- Is it time for fiber to the desk? One vendor's view. Page L16.
- Gibbs laments Congress' attempts to regulate E-Mail. Page L21.

# BRIEFS

Cabletron Systems, Inc. last week vehemently denied it was up for sale, terming rumors of buyout bids from both AT&T and Hewlett-Packard Co. as completely unfounded.

According to Robert Levine, Cabletron's president and chief executive officer, the company has never been up for sale and no one has bid on the hub maker since it went public in 1989. "I can't reject offers that have never been made," he said. "Anyone who says otherwise is either crazy, stupid or both."

Retix slashed prices on its SwitchStak 5000 Ethernet switching hub line by as much as 35%. The price changes are effective immediately and affect both the stand-alone and stackable models in the line. The eight-port stand-alone hub, for example, is now \$3,995, or less than \$500 per port. The eight-port stackable version is now priced at

Retix: (310) 828-3400.

**Hewlett-Packard Co.** last week rolled out the first in a line of network interfaces designed to link its HP 9000 Series 700 workstations to Asynchronous Transfer Mode networks. The first interface will support the 155M bit/sec Synchronous Optical Network OC-3 standard, with a Category 5 unshielded twisted-pair version due early next year. ATM adapters for the HP 9000 servers are planned for first-quarter 1995.

The OC-3 ATM Adapter will ship in November for \$1,995.

HP: (415) 857-1501.

Interphase Corp. last week introduced a fiberbased interface that allows direct connection of a Unix workstation to a public-switched Asynchronous Transfer Mode network. The new single-mode Synchronous Optical Network media module attaches to the company's 4615 SBus ATM Adapter to provide the connection to a public ATM net. The module is available now and costs \$ 1,995.

Interphase: (214) 919-9000.

# No excuses!

A quarterly review of innovative LAN products.

**BY MARK GIBBS** 

Some of the interesting wares that have surfaced in the last quarter include products that remove the need for excuses in two important areas: where files are and where you are.

Function

**Platforms** 

Vendor

Address

Telephone

Fax

Internet

The problem of where files are is dear to every user and network manager one that is usually expressed as the "where the %#\*! has that file gone" syndrome.

Part of the problem lies in the number of files that can be created in the course of routine operations and the amount of disk space to which most users have access.

Another part lies in the ridiculous file naming scheme that afflicts DOS and has been inherited by Windows.

The idea that users should still be saddled with the antiquated "8-plus-3" character naming convention more than a decade after the birth of the personal computer is hard to justify (and often used as ammunition by Macintosh and Unix users).

To address these problems, start-up comdows NT and Windows for Workgroups.

pany First Floor, Inc. of Mountain View, Calif., has developed an interesting solution called Network Central that runs under Windows on PC-Network File System, Novell, Inc. NetWare and Personal NetWare, and Microsoft Corp. LAN Manager, Win-

#### **Hot tickets**

**AirNote** 

address.

#### **Network Central**

A networked, multiuser file management and tracking system.

Introductory price of \$99.95 through September 1994; regularly priced at \$179.95. Windows on a wide variety of

networks. First Floor, Inc. 444 Castro Street, Suite 200, Mountain View, Calif. 94041 (800) 638-8253, (415) 968-1101 (415) 968-1193

ncentral-support@firstfloor.com | support@airnote.net

First Floor has created what it calls a virtual file cabinet, essentially a database of pointers to files.

These pointers are called tags and can be given real names such as project expense

#### Pager system linked to Internet E-mail with rules-based message filtering and forwarding software, as well as bundled Internet

\$349 (Excludes monthly service charges.)

Notable Technologies, Inc. 2030 Franklin Street, 4th Floor, Oakland, Calif. 94612 (800) 570-0000, (510) 208-4400 (510) 444-4493

forecast rather than the usual prjexpfc.xls that you are forced to use.

Tags can also contain descriptions, a note area in which you can add comments, such as "Edit for management report completed," to a file. The entire file cabinet can be shared with other users, which means that Network Central acts as a kind of group-

Unlike many of the groupware products available today, Network Central is very easy to learn, has low administrative and management overheads, and does not make

> much impact on network disk space or resources.

This makes Network Central suitable for small networks, where a way of organizing group work is needed but the cost of going with Lotus Development Corp. Notes is prohibitive.

The Network Central user interface is a little on the technical side, but most professional users will be able to master it

after an hour's training.
When you fire up Network Central for the first time, you are presented with the opportunity to

create a file center/cabinet.

You can create any number of different file centers. For example, you might create one for your private work and another for See Hot products, page L14

# IBM rolls out latest version of LAN Server

**BY PEGGY WATT** 

IBM this week will formally announce LAN Server 4.0, a stepping-stone update of its local-area network operating system that drops remaining Microsoft Corp. ties in favor of all-IBM code and lays the foundation for more advanced NOS features in the next version.

The release gets a warm reception from a large pool of early users, who praised its ease of installation, graphical features and interoperability. LAN Server 4.0 underwent two months of an essentially "open" beta test, in which IBM provided copies on request to LAN Server 3.0 customers. The company distributed more than 1,000 copies, an IBM

representative said.

The release is a strategic one for IBM because it cuts code ties (although not network links through Network Basic I/O System) to Microsoft and draws LAN Server more in line with the IBM Network Blueprint, said David Passmore, president of Decisis, Inc., a Herndon, Va., network consulting firm.

"It's not a radical revision, but it has a place in IBM's enterprise," Passmore said. LAN Server 5.0 could easily add support for DCE and objects, bringing directory services and enterprisewide naming.

Early users attested to its speed, robustness and ease of administration.

"It's solid and stable, and the

user interface for administration is much better," said Albert Crosvy, a network support specialist with the University of Arkansas who installed an early beta version in June. He's upgrading a 150-node net from Microsoft's abandoned LAN Manager to IBM LAN Server 3, and expects to install LAN Server 4 on at least one of the three servers.

"From the administration point, the [graphical user interface] is a vast improvement over the full-screen interface in LAN Server 3," he said. The other big change is direct support for TCP/ IP, symmetric multiprocessing and Pentium-based machines.

LAN Server 4.0 is clearly optimized for use on Pentium systems, agreed Peter Sierant, a systems engineer with Thomas-Conrad Corp. in Austin, Texas. "A lot of software actually runs slower on a Pentium than on a fast 486 because the chip is different

See LAN Server, page L9

Product: LAN Server 4.0 Company: IBM

#### The benefits:

- Graphical, easy-to-use installation and administration
- Native TCP/IP support
- Faster (IBM claims up to 200%; early customers verify speed boost.)

#### The drawbacks:

- · Market limited mostly to Big Blue shops.
- No DCE support in this version (although promised for next version).
- Not a major upgrade.

# The user view:

I did installations on three servers and migrated my databases straight over without any problem. 77

Robert Labenski, CEO, Client/Server Networking, West Hartford, Conn.

# **Making sense of TCP/IP** in DOS, Windows shops

No one wants to deal with the bothersome details of getting TCP/IP to work on DOS- or Windows-based PCs; everyone simply wants access to TCP/IP based applications, such as telnet, FTP and Gopher.

To properly support TCP/IP in a corporate network, you have to address three questions: What kind of driver should you use? What kind of stack should you use? Where should you get the applications (see Figure 1)?

Since the TCP/IP protocol stack you choose depends in part on what device drivers are in use on the PC, it makes sense to start there.

In the early days of MS-DOS, device drivers were specific to a single protocol. That meant if you wanted to run more than one network application, such as NetWare and TCP/IP, you had to reboot to load and unload the device drivers.

Since this was obviously a poor way to run a net, several organizations started to develop better ways of interfacing LAN adapters to network protocols. Unfortunately, this resulted in three popular solutions to the problem.

In 1989, Microsoft and 3Com Corp. jointly developed the Network Device Interface Specification (NDIS), which defines a way for a network adapter device driver to work with multiple net protocol stacks at the same time.

NDIS device drivers provided by LAN adapter manufacturers allow up to four protocols to sit on top of any LAN adapter. This would let you run Microsoft's LAN Manager or Windows for Workgroups over the same LAN adapter as a TCP/IP stack.

Most vendors support NDIS Version 2.0, also called real mode NDIS. NDIS 2.0 drivers were written for the standard MS-DOS environment, will operate on 80286-based systems, use a 16-bit data path, run in real mode and reside in conventional memory.

With the release of Windows for Workgroups 3.11 last year, Microsoft added support for NDIS Version 3.0, also known as enhanced

mode NDIS. NDIS 3.0 came out of the Windows NT work and is the device driver of choice in Windows NT. NDIS 3.0 drivers require an 80386 or higher-based system, use a 32-bit data path and reside in protected mode extended memory.

#### **OTHER OPTIONS**

Naturally, Novell has a different way of doing things. The Open Datalink Interface (ODI) does almost exactly the same thing that NDIS does, except that the programmer interface is completely different.

ODI comes with its own set of pieces and acronyms. The LAN adapter talks to a Multiple Link Interface Driver, which passes the packets up through a Link Support Layer and across a Multiple Protocol Interface to the protocol, such as NetWare's IPX or TCP/IP.

The third and least popular solution to the driver problem is packet drivers, which predate NDIS and ODI. FTP Software, Inc., one of the oldest of the MS-DOS TCP/IP vendors, did not want to build its TCP/IP protocol stack into the device driver for every LAN adapter it needed to support. To minimize work, it developed an application program interface (API) to a LAN device driver, which it called the Packet Driver Specification.

While at Clarkson University, Russ Nelson published a packet driver for an Ethernet board so he could use it with FTP Software's TCP/IP stack. Since the university community was used to buying whatever LAN adapters were the least expensive at the moment, they ended up developing lots of drivers.

Now commercial software, his collection of drivers is known as the Crynwr collection and is freely available over the Internet from oak.oakland.edu or on CD-ROM from CD Publishing at (800) 333-7565. Nelson can be reached at nelson@crynwr.com.

Is there a difference between these three?

Not to the network manager. All popular network device adapters have all kinds of drivers available. However, you should use whichever driver type is most natural to the protocol you want to run.

NetWare-centric networks should start with ODI, while LAN Manager, Windows for Workgroups or Pathworks nets should lean to NDIS. For a PC running only TCP/IP, packet drivers take the least amount of memory and are very easy to install. Most TCP/IP vendors support all three driver types.

Certain protocol combinations can be a problem. For example, if you want to use both Windows for Workgroups (which runs over

TCP/IP

Winsock

NDIS API

How TCP/IP stacks up

Figure 1

TCP/IP

application application application

TCP/IP protocol stack

**ODI API** 

Device driver (talks directly to

LAN adapter)

LAN adapter

Vendor proprietary

driver API

NDIS) and NetWare (which runs over ODI), you have to bring in something called an API shim. Shims are used to adapt one kind of device driver to a different calling scheme. In this case, you would have to add ODINSUP, which lets both NDIS and ODI stacks run over ODI drivers.

The problem with shims is that every layer you add to a protocol stack increases the chance of bugs and incompatibilities.

Many API shims are also public domain or shareware, which makes support a problem.

### STACKING TCP/IP UP

Just as there are three divergent views on the proper way to integrate device drivers into MS-DOS and Windows, there are also three ways to put a TCP/IP stack on top of those drivers (see Figures 2 and 3).

Originally, TCP/IP vendors had to cope with both MS-DOS PCs and PCs running Windows on top of MS-DOS.

In Microsoft's architecture for MS-DOS, the most appropriate way to do that was with a terminate-and-stay-resident (TSR) application. TSRs are the closest thing to multitasking in the pure MS-DOS world; they enable a network protocol to remain in memory and maintain context between applications.

The problem with TSRs is they must sit in the bottom 1M byte of system, or real mode, memory and must allocate all the memory they will need when they first load. Since that low 1M byte of memory has become a precious resource, anything you can move out of it frees up space for other needs.

TSRs can also cause performance problems, as any communication between a Windows-based application and the TSR requires a CPU context switch in and out of real mode.

For this reason, the next step up in TCP/IP stack technology uses a Windows programming construct called a Dynamic Link Library (DLL). DLLs are 16-bit programming libraries dynamically loaded and unloaded by the Windows scheduler as applications call for them.

Unfortunately, DLL-based net stacks are at the mercy of the applications running in Windows. A higher or equal priority Windows task can completely block TCP/IP net services.

DLLs have another advantage for those who have been burned by buggy software. They operate at the outermost protection ring (3) in the Intel Corp. memory management system, called User Mode.

An application gone amok in User Mode will not stomp all over Windows and other applications; it is isolated by the management

The third common technique that most vendors are scrambling to include in the newest versions of their software is known as the Windows Virtual Device Driver (VxD).

A VxD-based TCP/IP stack operates as a device driver to the Windows operating system in the same way the mouse device driver works: It operates at the most privileged memory management level, ring 0 called Kernel Mode, which gives performance advantages over DLL-based stacks.

VxD-based stacks also stay in memory at all

times, which may be a disadvantage for memory-poor systems. Since VxDs run at Kernel Mode, a bug in the TCP/IP drivers can crash the system.

Choosing between TSRs, DLLs and VxDs depends on your environment. TSRs are most appropriate when a pure MS-DOS (for example, without Windows) environment is mixed with a Windows environment.

Neither DLL nor VxD-based TCP/IP stacks can suppor

applications running outside of the context o Windows. Because DLLs are dynamically loaded and unloaded, they only work with true Windows applications. For applications that run in the DOS Compatibility Box inside of Windows, either VxD or TSRs can provide TCP/IP.

#### THE END RESULT

Once you have solved the question of device driver and stack, you can address the real reason you started this exercise: getting TCP/IP applications running.

Most net vendors do not make the distinction between protocol stack and applica-

Normally, you buy a stack and you get some set of applications that run on that stack, which may or may not be what you wanted. As the range of applications gets too large for any one vendor to control, plan on going to multiple vendors to satisfy your TCP/IP needs.

A key to application portability in the Windows world is the Windows Sockets, or Winsock, programming interface standard. It is a Windows version of the popular sockets net programming interface developed for Unix by the University of California at Berkeley.

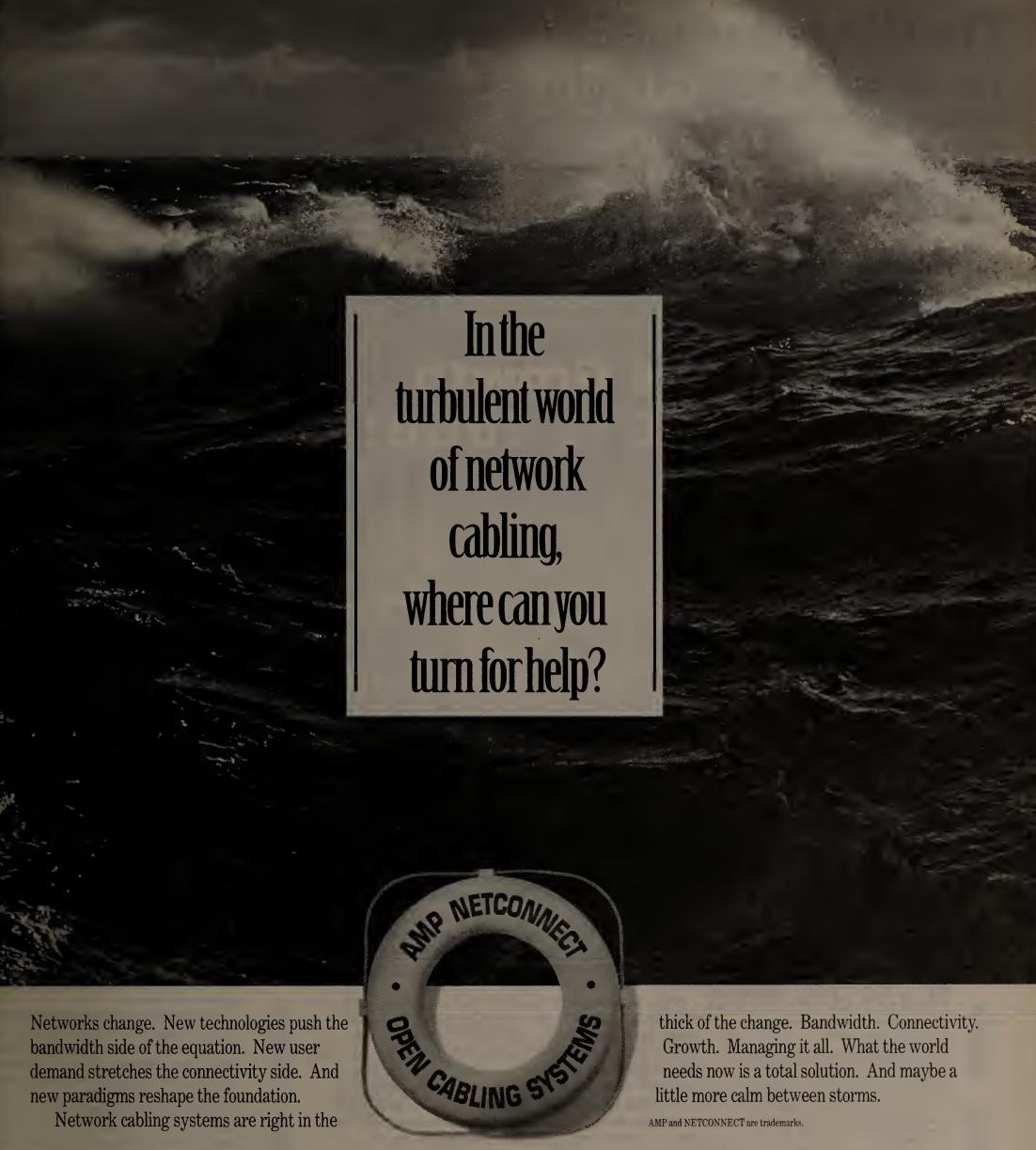
Just as TCP/IP vendors interface down to their device drivers using packet drivers, NDIS or ODI, they can interface up to applications using the Winsock interface; and almost all provide a Winsock interface with their stack. For the first time, Windows applications can be unlinked from a particular TCP/IP stack by using a Winsock DLL.

Spry, Inc. in Seattle is the first vendor to understand the difference between applications and stacks. It sells a full suite of applications separately from any TCP/IP stack.

If Microsoft follows through on its offer of a free VxD-based TCP/IP stack for future versions of Windows, the application-only direction of Spry may become the standard for the industry.

#### Layering TCP/IP stacks on device drivers: Weighing the 3 options. Figure 2 Supports DOS | Minimal use performance MS-DOS of DOS real compatibility systems environment memory VxD-based stack TSR-based stack DLL-based stack \* Not all VxDs support the DOS box. SOURCE: FTP SOFTWARE, INC., NORTH ANDOVER, MASS GRAPHIC BY SUSAN J. CHAMPENY

	Sourc	es of TO	P/IP s	tacks		
		Figur	e 3			
Vendor	Stack type supported			Driver type supported		
	VxD	DDL	TSR	NDIS	ODI	Packet driver
FTP Software	V		V	V	V	V
Ipswitch	V		1	1	V	V
Novell			1		<b>V</b>	
The Wollongong Group			1	1	V	V
Intercon Systems	V	1	1	1	V	/
Beame & Whiteside		1	1	1	V	V
Frontier Technologies	V			/	/	/
NetManage		1		1	V	
Walker, Richer & Quinn	V				/	
SunSelect			1	/	V	
Microsoft		V		/		
Distinct		1		/	1	V
Trumpet Software		1				V



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# The touch-tone LAN client goes mainstream

Availability of IVR tools, telephony apps enhance mart.

BY TONY CROES

Ever wonder if that laptop and jumble of cables and peripherals you carry around for remote LAN access is really all that conve-

Believe it or not, there may be a better way to get information using an old and trusted friend: the telephone.

Using phones to tap into computers is an age-old concept called Computer Telephone Integration (CTI). But CTI has traditionally

been the territory of large companies, the systems costing hundreds of thousands of dollars and typically involving use of mainframes.

Despite the expense, many firms will pay for systems they believe yield a significant competitive edge. You probably use several telephone-enabled computer applications each week, like interactive voice response (IVR) systems that let you check on the status of orders or call in for your bank balance.

Although even personal computer-level products for CTI have been available for years, two recent trends are bringing telephony applications out of the exclusive call center environ-

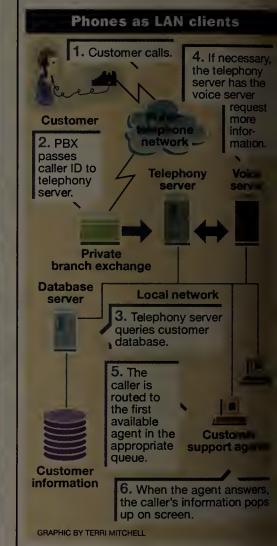
ments and into mainstream LAN environment on PCs (see graphic).

The first is the availability of tools that and IVR capabilities to popular client/server groupware development environments. T second is the availability of shrink-wrapped. ready-to-run telephony applications.

#### **DEVELOPMENT TOOLS**

Most of the PC telephony applications e use today revolve around boards from vendors such as Dialogic Corp., Natural MicroSystems Corp. and Rhetorex Inc. that run at the desktop or in telephony servers.

Although these vendors provide application program interfaces (API) for their hardware, the greatest impact in the local network world comes from client/server and groupware tools that use these APIs to integrate telephony features into familiar applications.



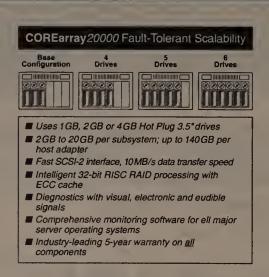
Edify Corp.'s Electronic Workforce, for example, is a rich development environment that enables customers to integrate telephony support into mainframe and LAN applica tions. Electronic Workforce makes it possible to directly access data from Oracle Corp. Sybase, Inc., DB2 and Btrieve databases, or use software agents as proxies to control exist-

The Electronic Workforce graphical development environment and the agents run on an OS/2 server. New remote mail software from Edify allows Electronic Workforce to read (via text-to-speech synthesis) or fax messages from

Visual Voice 1.01 from Stylus Innovation, Inc. is a custom control that extends telephony services such as call control, interactive fax and IVR capabilities to Microsoft Corp. Visual Basic applications. The Visual Voice workbench is an environment that lets you develop forms, queries, voice files and subroutines and then directly generate the corresponding Visual Basic code. The resulting application run on a PC with a Dialogic board.

When linked with WinFax PRO, a fax software package from Delrina Technology, Inc.,







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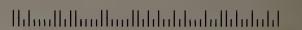
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you can even create interactive fax systems. At \$495 for the software and \$695 for a two-port Dialogic board, Visual Voice is inexpensive and powerful.

#### **PHONE NOTES**

With the addition of Phone Notes from Lotus Development Corp., the already rich Lotus Notes environment gains the ability to use a telephone as a Notes client. As David Rome, general manager of the Notes Product Division explained, Phone Notes is a set of 17 forms for Notes that performs telephony functions such as Wait for a call, Play greeting, Record message and Branch to next form.

All of the forms and scripts that make up a Phone Notes application are stored in a Notes database. A separate telephony and voice server from Simpact Associates, Inc. — the OS/2-based Remark PhoneClient for Notes reads the script from Notes and uses it to control the phone, prompt a user with voice responses, and access or store information in Notes databases. Since the application itself is a Notes database, deploying it across the enterprise is merely a matter of replicating it to other Notes servers.

When combined with other Notes gateways, such as the Pager and Fax gateways, you can create some interesting 24-hour, 365-dayper-year customer service applications.

If a customer calls in with a problem, for example, an application might start a workflow process that checks payment status, equipment inventory and past problems, then fax it to the next available service representative and page the rep.

#### CALLWARE

Like Phone Notes, CallWare from International Voice Exchange, Inc. blurs the line between being a development tool and a readyto-run application. CallWare runs as an Net-Ware Loadable Module (NLM) on a NetWare server providing a stand-alone voice processing engine designed to provide voice mail, IVR, auto attendant, fax send/receive capabilities and integration with standard E-mail systems. It runs on boards from Dialogic, Natural MicroSystems and Rhetorix.

When combined with the CallWare ALM for Novell, Inc.'s AppWare development environment, the CallWare AppWare Loadable Module becomes the server engine for net telephony applications. The resulting applications benefit from all of the features provided by AppWare, including linking telephony services with ALMs from other vendors and the ability to deploy the applications to any client supported by NetWare. At less than \$4,000, the CallWare NLM brings call center capabilities to the realm of the LAN workgroup.

#### **COMMODITY APPLICATIONS**

Even if you are not a developer, there are a number of ready-to-run telephony applications currently available. Most of these products are geared toward integrated messaging (the combination of E-mail, voice mail and fax in a single in-box), with the ability to read or fax messages over the phone.

Campbell Services, Inc. now has an On Time Interactive Voice Response system for accessing calendar information while on the road. "For the mobile computer worker, [IVR] is a very valuable application," according to Craig Settles, a senior strategist at Successful Marketing Strategists, a marketing company in Berkeley, Calif. "There are phones everywhere on the planet — it's a serious global network that can provide easy access to LAN- based information. Campbell Services' OnTime Interactive Voice Response system indeed does this."

The OnTime IVR system uses technology and hardware from VoxLink Corp., another developer of telephony technologies. VoxLink sells a modular software system for accessing E-mail from Message Handling Service (MHS), Microsoft Mail, cc:Mail and other mail sys-

The VoxFax module sends mail messages via fax, VoxSpeak uses text-to-voice technology to read messages over the phone, VoxVoice

E-mail messages, and VoxAlert notifies users of new E-mail via a page.

At Currid & Co., we have been using the Novell GroupWise 4.1 — formerly WordPerfect Office 4.0 - Telephone Access Server (TAS) since it was in beta test. From the beginning, it has been tremendously useful.

TAS runs on a Dialogic board in an OS/2 server and provides access to all of the features of Novell GroupWise, including listening to and sending mail messages, notes, task assignments, group schedules and phone messages.

TAS uses a version of OS/2 SmoothTalker, a

into audible responses from First Byte, a subsidiary of Davidson & Associates, Inc. You can listen to messages, set up new appointments and record voice messages that appear in users' desktop in-boxes. If the GroupWise Fax/Print gateway is installed, you can even have your messages forwarded to a nearby fax

All in all, telephony services are a great enhancement to PC and LAN applications.

Croes is an industry analyst with Currid & Co., a technology assessment firm based in Houston. He can



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# Net analyzers, test equipment to flood NetWorld +Interop

BY SKIP MACASKILL

Help is on the way for net managers wrestling with local networks that grow increasingly large and complex on a daily basis.

Several vendors this week at the Net-World + Interop trade show here will highlight new and enhanced management products that

allow users to discover net usage levels, analyze traffic patterns, and track software licenses and a host of network statistics.

FTP Software, Inc., for example, will showcase LANWatch 4.0, a new release of its DOSbased network analyzer that features a new graphical user interface (GUI) and expanded protocol and network driver support.

The mouse-driven GUI converts LAN-Watch's DOS command-line interface into a point-and-click operation with pull-down menus, making the product easier to use. A new menu-based installation program and redesigned on-line help feature also reduce the learning curve for new users.

The company added the ability to decode a new suite of protocols, including Novell, Inc. NetWare 4.X, NetWare IP, Simple Network Management Protocol over IPX and SNMP over Banyan Systems, Inc. VINES. Support for the Open Data-link Interface network driver has also been added.

Statistics displayed in LANWatch's Network Utilization Mode can now be saved in a space-delimited file and imported into spreadsheets, allowing users to graph usage and other

#### AXON

In a separate action, Axon Networks, Inc. has unleashed in time for the show a new set of products that will help users collect net usage information and other Remote Monitoring (RMON) data at a central location.

As a lower cost alternative to its LANServant Probe — a Reduced Instruction Set Computing-based network analysis server — Axon rolled out the LANServant Agent and LANServant RMON Probe. The hardware probe sits on either Ethernet or token-ring LANs and captures RMON statistics on locally attached devices, passing that information on to Axon's LANServant Manager running as a stand-alone application or on top of a third-party SNMP management platform.

Putting a price on mgmt.				
Company/Product	Price	Availablu		
FTP Software		ı		
LANWatch 4.0	\$1,200	Now		
Axon				
LANServant Agent	\$1,200	October		
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Manager		_		
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Chameleon Open-X	\$14,500	Now		
Wavetek		-		
LANtek Pro	\$3,995-	_		
Series	\$4,495	December		
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Ethertest	\$2,995	Now		

The LANServant Agent runs on a workstation attached to a segment and emulates an RMON probe, compiling RMON data and passing it along to LANServant Manager.

Axon also unveiled LANServant Manager

for Windows, a network management application similar to the company's Unix version that is designed for managing remote LANs.

Network Application Technology, Inc. (NAT) is also focusing on its line of probes. The company has introduced a new DOS utility that allows network information gathered by its EtherMeter network probe to be analyzed by most third-party protocol analyzers.

TraceTool converts Ethernet network data compiled remotely by EtherMeter probes into formats that can be read by a range of analyzers, including Wandel & Goltermann Technologies, Inc. DA-30, IBM DataGlance, Network General Corp. Sniffer, Hewlett-Packard Co. Network Advisor, Intel Corp. NetSight, FTP's LANWatch and a host of others.

Instead of moving a protocol analyzer around from segment to segment, users can offload data to TraceTool, which then acts as a front end to a centralized protocol analyzer.

### **TEKELEC**

Tekelec, Inc. — whose analyzers are not on the list of devices that TraceTool can front-end — is also rolling out a new addition to its line.

The Chameleon Open-X is a 12-slot protocol analyzer that can test as many as 12 net-See Analyzers, page L18



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# **User-developed system lets firm** grow net without adding staff

Hub switching capabilities enable company to daisy-chain Sniffers across multiple LAN segments.

BY JOHN DIX

Wouldn't it be nice to be able to grow your network without having to ramp up staffing levels at the same rate?

AlliedSignal Technical Services Corp. has developed a system based on off-the-shelf components that minimize staffing requirements by enabling an individual to manage, analyze and configure distributed local networks from a central workstation.

The system, called Integrated MAC, earned developer Mike Pate, an AlliedSignal senior engineer, one of three Call for Innovation awards at the recent International Communications Association conference and exposition

Pate developed Integrated MAC for use at the Johnson Space Center, where AlliedSignal is the subcontractor that designed and runs the network supporting the space shuttle simulation facility. The network is used to balance program loads across distributed Unix systems and back up the machines to a tape silo.

While a mainframe is used to control the hydraulic systems that pitch the simulator around to mimic flight, the Unix-based computers are used to provide aural feedback, simulating things like engine noise and images the astronauts would expect to see when the bird is

Unix platforms consist of a range of machines, including Sun Microsystems, Inc. SPARCstations and SPARCstation clones, and Silicon Graphics, Inc. workstations. All of the devices run TCP/IP protocol stacks and are linked using hubs from Chipcom Corp. outfitted with internal Cisco Systems, Inc. IGS rout-

AlliedSignal employees are located in one of four Johnson Space Center buildings that together house the shuttle simulator facility.

Recognizing that limiting simulator downtime meant curtailing the need to dispatch technicians and that the company's contract did not provide for staffing growth, Pate set out to devise a maintenance system that minimized travel and maximized technician effi-

The former was important in the short term, while the latter was critical in the long

"To ensure that our maintenance staff would not have to grow linearly with the size of the network, we cooked up this thing called the Integrated Management, Analysis and Configuration system," Pate said. "It allows us to grow the network in scope several hundred percent before we have to think about hiring."

### **BEFORE AND AFTER**

AlliedSignal originally troubleshot the network using local consoles for the Chipcom

"When problems came up, we had to dispatch people with [Network General Corp.]

portable Sniffers, and they would analyze the problem and then reconfigure the network as needed," Pate said.

Integrated MAC was designed to reduce the time and manpower needed to rectify problems by integrating console capabilities, management applications and configuration tools into what Pate calls a MAC station.

The MACstation is based on SunNet Manager — meaning it supports Systems Network Management Protocol management - running on a Sun SPARC 10 clone and outfitted with device-specific configuration applications for the Chipcom hubs, Cisco routers and Network General Distributed Sniffer Systems.

But perhaps the most innovative feature of the system is the combination of the port-level switching capabilities of the Chipcom hubs with Distributed Sniffers.

The Sniffers are attached locally to one hub and daisy-chained to the other hubs across switch modules in each concentrator. Because any port on any concentrator can be connected to any LAN, "we're able to switch a Distributed Sniffer to any LAN we need to analyze,"

"We can, in effect, jumper a Sniffer to another concentrator in a different building without having to do any physical work," Pate explained. "We use the switching capabilities and the configuration tools and the Distributed Sniffers to make for a very inexpensive and cost-effective distributed analysis solution."

Pate pointed out that the hubs are outfitted with repeaterless concentrator cards. If they were repeater-type cards, the reach of the Sniffers would only be four hops.

#### **DISPATCHING SNIFFERS**

Whereas once an alarm would result in troubleshooters being dispatched to the LAN where the problem originated and the LAN

**Daisy-chaining Sniffers** 

Hub switching lets AlliedSignal patch a monitor into any remote LAN segment. Chipcom

Instead of dispatching workers, technicians can patch Sniffers into remote LANs by using hub switching modules to daisy-chain one hub to the next.

supporting the resource the originating station was trying to reach, now Distributed Sniffers can be dispatched in their stead.

When trouble hits, "we dispatch two sniffers — one to the destination net and one to the source network," Pate said. "And then we squeeze our analysis down to the segment that is the source of the problem by relocating those Distributed Sniffers."

# Training pays big dividends, and new options make it palatable

BY DOUGLAS WELCH

Computers are not automobiles.

Despite many attempts to equate the two, most people can still get into any car and drive it. It is a rare computer user who can sit down at any computer and immediately be produc-

While we may want systems like those found on the Starship Enterprise, computers still require users to know a little, and sometimes a lot, about their use and operation.

Untrained users are a burden to their employers. They cripple the ability of the company to do business in a timely fashion. By the same token, companies that do not train employees cannot expect them to be able to make the best use of system investments.

Not only does training make life easier for users, it also provides a benefit to network support staff. Nothing is more frustrating than trying to assist a user over the phone who does not have enough knowl-

edge to explain their problem clearly. They might as well be speaking different languages.

Every user needs a base level of knowledge so they can solve basic problems and explain more complex problems to support people.

### TRADITIONAL TRAINING

Traditional training usually takes the form of long (half- to one-day) classes with an instructor. Due to their group orientation, these classes tend to cover rather general mate-



It is also difficult to include company-specific information that would be of good use to

Frequently, users do not feel they can be

away from their jobs for the four, eight or more hours that a classroom environment requires. They want to concentrate on getting their job done and not on how to do it. When the costs are added up, group computer classes are hard to justify.

The tremendous speed of innovation in the computer industry can hinder training, as

In large installations, it is often impossible to get all users through training on one version before the next version is released. The waste of effort and money involved has made more than one company reconsider their training

programs.

In an effort to find an answer to training problems, many companies are turning to alternative training methods to get the job done. These methods include videotape tutorials, audio tape practice sessions, written tutorials or any combination of the

Some outfits have also started to develop company-specific training classes that last about an hour and cover one issue regarding the LAN environment.

Another method is development of formal user groups or informal sessions that can be used to answer users questions and find out what users need to know to do their job better.

These sessions — one company calls them Computer Snacks — can be held during lunch hours, during the business day or after hours. It is worthwhile to set aside work time for these sessions if possible. They take less time than formal classes and are usually much more effective at addressing users' needs.

The major benefit of alternative training methods is they allow users to learn at their own pace on their own time.

More training can be accomplished in pauses between critical work than might ever be absorbed in a mind-numbing, full-day

Tapes, books and tutorials allow users to start and stop the training whenever needed Users can also review confusing or complicated operations as many times as they feel necessary. There are no other students to worry about - no one going too fast or too slow

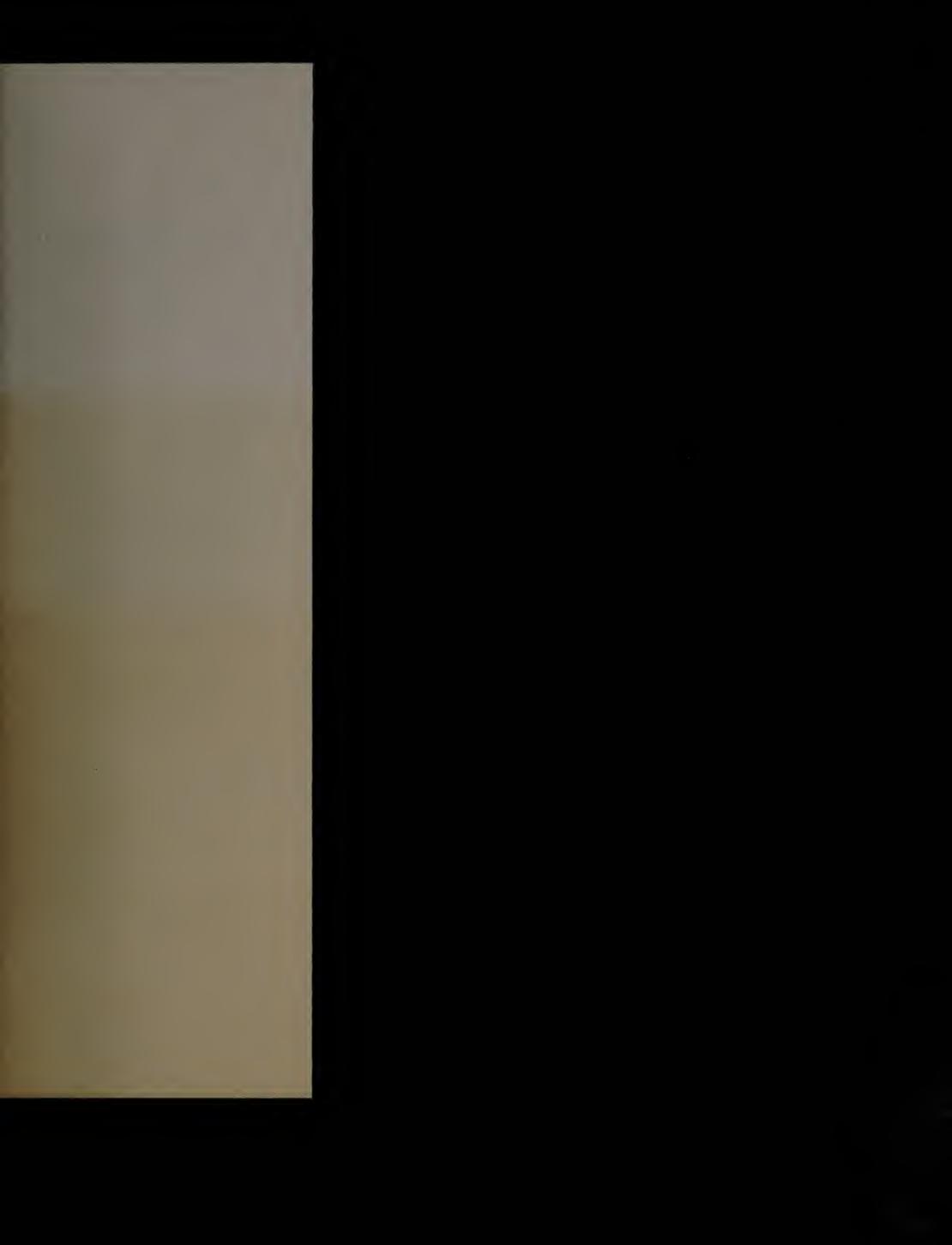
Users can concentrate on the skills they need most. Perhaps they would spend most of their time in the charting section of a spread sheet program where they can learn all the tips and hints they need right away.

Learning a program according to their needs makes users more productive more quickly. They will have time later to go back and learn the esoteric functions since they will be accomplishing more in less time.

### **MANAGEMENT'S VIEW**

While seemingly unrelated, management's view on training can have a great effect on its success or failure. If management does not view training as important, they will sabotage any effort to establish a program.

Management must allow users to attend classes or pursue alternative training methods without fear of retribution. Time spent with training tools should never be seen as wasted





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The average time to identify the cause of network problems has been slashed by 75%—about a half hour vs. roughly two hours before the system was installed, he said.

Sometimes problems can be fixed without dispatching anyone, as when the problem simply involves a corrupted router configuration or router table, which can be reset from the MACstation.

Glitches that require human intervention are still less burdensome because now only one technician needs to be dispatched instead of two, and when they hit the street, they know exactly where the source of the problem is and have a good idea of how to fix it before they arrive, Pate said.

Besides enabling Pate to minimize downtime for the shuttle simulator while maximizing the efficiency of technicians, the system can accommodate a tremendous amount of network growth without a concomitant growth in human and analysis resources.

"I believe we could grow the net 100% to 200% without needing any more technicians or Sniffers," Pate said. "We have three hubs in a daisy chain, and that will grow to four and possibly a fifth. With four Sniffers and in excess of 20 LAN segments, we are rich in Sniffers."

The one drawback to the daisy-chain approach is that a failure could knock out communications with everything downstream.

According to Pate, that is true, but that diagnostics available through the Chipcom configuration tools should help limit the impact of such failures by quickly detecting lose of connectivity.

"If we've lost links between concentrators, we are then in a position to reallocate connections by manually changing ports or running a new fiber or repairing a fiber," Pate said. "The point is we'll know about it fast."

time. It shows initiative on the part of the user. They are working to improve their skills and therefore their work.

Management also needs to assist informal training methods. Provide a small budget for refreshments during a user group meeting or lunchtime session. Allow the use of company equipment and time to print and distribute advertising for these sessions. Create a newsletter that provides tips, hints and traps for users while also providing interesting stories on how other employees are using their equipment to do a better job.

Reach out to users and show them the benefits to both themselves and the company when they make an effort to gather more computer skills

If companies truly want to boost their productivity, they must look beyond the usual answers provided by traditional training methods. Through changes in management attitude and the use of alternative training methods, most companies can build a work force that can handle just about any problem sent their way.

They can reduce the pressure on support staff by providing a base level of knowledge for all users so that the users can solve basic problems themselves and explain more complex problems to their computer support staff. Turn computer users into an asset instead of allowing them to become a liability.

◆ Welch is a support analyst for a major entertainment corporation in Los Angeles. He can be reaced via the Internet at 76625.3310@compuserve.com.

# LAN Server

Continued from page L9

and the software has to be optimized. LAN Server is optimized, and the performance is excellent." He notes that IBM recommends a minimum configuration of at least a 80486 system with 16M bytes of RAM.

Sierant tested LAN Server 4.0 in the Thomas-Conrad labs to ensure interoperability with his company's wares, which include high-speed network adapters, hubs, and diagnostic and management software. "It's impor-

tant to me that it supports TCP/IP natively, and is no longer tied to NETBEUI. You can run NETBIOS on top of TCP/IP," he said. "With LAN Server 4.0, IBM is trying to achieve protocol independence and interoperability."

Sierant counts among the best features the product's enhancements to Link Access Procedure protocols. IBM's support for Multiprotocol Transport Network services makes it much easier to add support for other vendors' drivers, he said.

IBM first distributed the beta version through its IBM Link service, then sent CD-ROM discs to interested users. Documentation

is on-line, except for an introductory manual to get users up and running.

The early users were mostly Blue shops that were pleased to see the stalwart enhanced; IBM's challenge is broadening that base, noted Michael Howard, president of the consulting firm Infonetics Research, Inc. in San Jose, Calif. 'IBM LAN Server 4 could have a limited market, mostly among existing customers," he said. "There aren't any dissatisfied LAN Server users; the unhappy ones have moved on. It's a good product; it just hasn't gotten widespread market acceptance."

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# Concocting a recipe for the right multimedia mix

BY DAN MINOLI

All the ingredients to make multimedia happen are available: An industry consensus is emerging about how multimedia should take shape, existing products conform to a number of multimedia standards, and you do not have to search far for viable business applications —

The world of global networking,

often referred to as Cyberspace,

is under construction. The

Internet, one of the primary

building blocks on the road to

cyberspace communication,

offers companies of all sizes, in

all markets, the opportunity to

stake a claim in the globally

In both senses of capitalizing —

taking advantage of and profit-

ing from — the Internet provides

the landscape for businesses

to improve current practices

and establish new markets.

Organizational needs and

necessities such as research,

technical support and services,

marketing and publishing can

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early, strategic entry onto the

Internet by preparing to extend

and defend their markets will

prosper in the globally net-

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need to understand where

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everything from corporate training to collaborative computing fit the bill.

But can you deploy multimedia in an organization and reach all employees in the corporation? Not likely. A number of technical issues have yet to be addressed, and the components still need to be synthesized so the result is greater than the sum of the parts — just as a

gourmet meal is more than the mere mixture of the discrete ingredients.

Compression algorithms, for example, are critical to the viability of multimedia because multimedia objects are so large.

An uncompressed digital TV signal requires 140M to 270M bit/sec. Fortunately, video signals contain a lot of redundancy, so compression can reduce the bandwidth by a factor of 200-to-1, 100-to-1 or at least 10-to-1.

We also need standards so compression equipment can be cost-effectively purchased, mixed and integrated. Such standards have appeared in the past few years, and hardware

and software implementations are entering the market.

The pertinent compression specifications include: ITU-T H.261, JPEG, MPEG-1 and MPEG-2. MPEG-1 provides reasonable quality video for a data rate of 1.544M bit/sec: MPEG-2 supports entertainment-quality video at 6M bit/sec; H.261 supports videoconferencing-level quality at 112K, 384K, 768K and 1.544M bit/sec.

For multimedia to flourish, products should support standards such as MPEG-1 or MPEG-2, and hardware should cost \$350 or less.

In terms of storage considerations, the size of multimedia files typically requires use of CD-ROMs. CD-ROMs can hold 680M bytes, meaning they can store less than 15 minutes of video at 6M bit/sec (MPEG-2 encoded), one hour of video at 1.544M bit/sec (MPEG-1 encoded) or four hours at 384K bit/sec.

It is imperative to use fast CD-ROM drives with a throughput of at least 300K bit/sec and an access speed of 300 msec or better.

While deployment of stand-alone desktop multimedia systems is a routine thing, the next

For multimedia

to flourish.

products

should support

standards such

as MPEG-1 or

MPEG-2, and

hardware

should cost

\$350 or less.

major test is the ability to support networked environments.

Networking facilitates sharing of resources — multimedia programming, video jukeboxes, video servers, archives and peripherals.

To enable enterprisewide mul-

timedia, users need LANs with sufficient bandwidth, appropriate network operating systems (NOS), and ancillary software and video servers.

## **FAT LANS**

A number of LAN options exist to make departmentwide or enterprisewide multimedia a reality. However, none of the existing options are ideally suited to multimedia.

The inadequacies of existing shared-medium LANs — such as Ethernet, token ring and Fiber Distributed Data Interface — stem from the limited effective bandwidth per user, as well as network delays and, even worse, potential delay variation. Some applications, such as videoconferencing and collaborative work, can involve multiple parties, further complicating the throughput/quality-of-service issues.

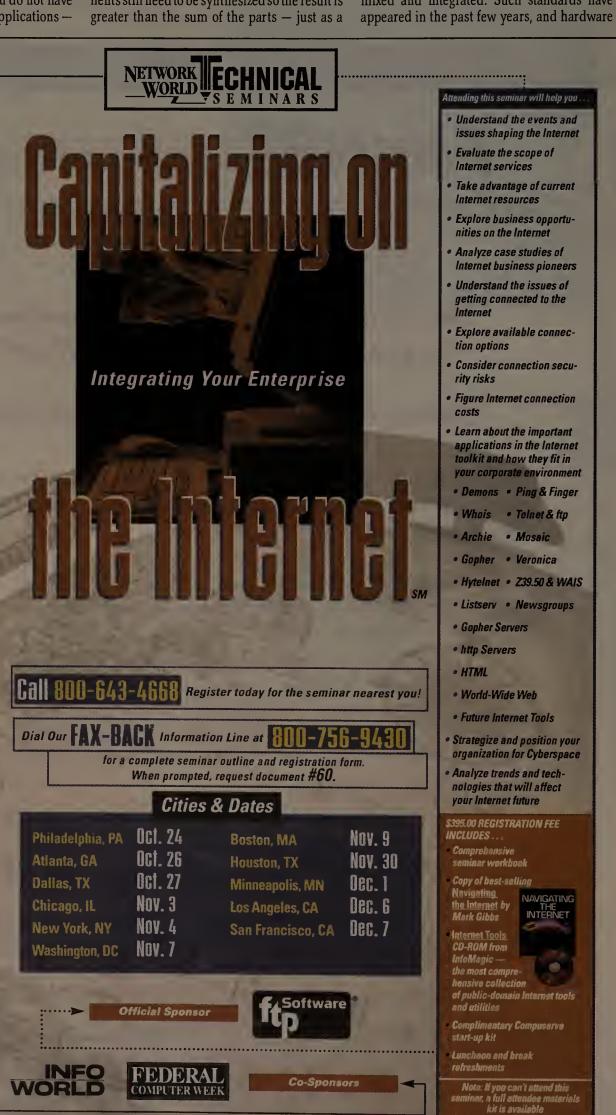
As discussed, multimedia requires between 1.5M and 6M bit/sec per user for education/entertainment-type applications and between 0.4M and 0.7M bit/sec for videoconferencing-type applications.

Even ignoring protocol overhead, this means that a 50% utilized 10M bit/sec LAN for education/entertainment-type applications could support one to four users or 10 to 15 users for videoconferencing-type applications. Therefore, current LANs would need to be microsegmented.

With a 100M bit/sec Ethernet or FDDI system, the number of users can be raised between 10 and 40 and 100 and 150, respectively, but that's still not enough to meet the needs of a midsize enterprise.

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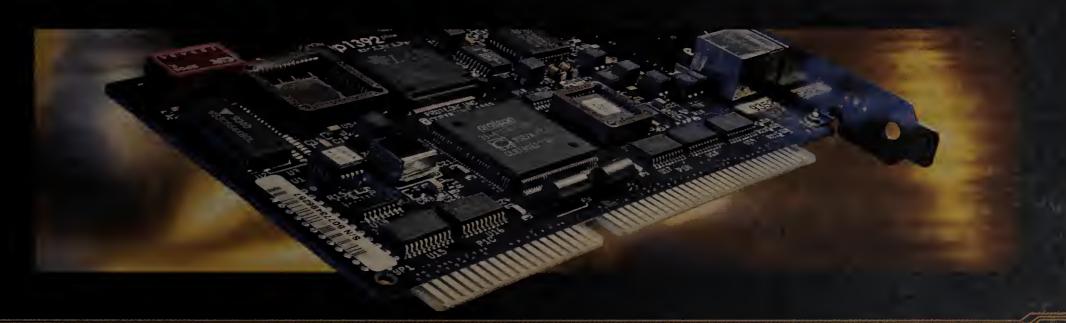
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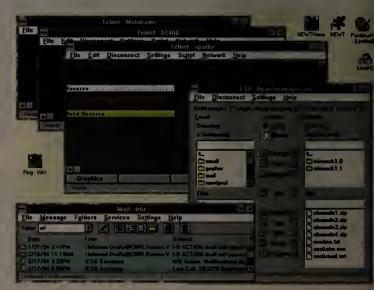
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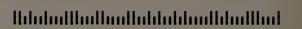
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# Multimedia

Continued from page L10

width begins to be adequate for supporting enterprisewide multimedia. For example, a 2G bit/sec hub can support 1,333 users employing 1.5M bit/sec MPEG-1 programming, 333 users employing 6M bit/sec MPEG-2 or 5,200 users doing videoconferencing at 384K bit/sec.

#### **DELAY VARIATION**

Even assuming adequate bandwidth, some LAN technologies are not ideal for multimedia because they introduce variation in delay. This makes delivery of real-time visual information a problem by introducing unpleasant artifacts.

One way to minimize delay variation over a shared-media LAN — such as Ethernet, token ring or FDDI — is to give the video traffic higher priority. A handful of LAN-based client/server video/multimedia products on the market use this technique. Still, the quality is marginal — that's why virtually all PC-based demonstrations you may have seen are based on a local CD-ROM drive.

To address the problem, LAN designers have developed new technologies that provide the ability to support isochronous channels. Isochronous channels are, in effect, shared-media channels that appear as dedicated channels of a specified bandwidth.

LAN systems, such as IEEE 802.9/802.9a IsoEnet and FDDI-II, provide one to 16 6M bit/sec channels, respectively, where there is no contention and multimedia can be supported in its natural constant bit rate signal form.

However, there are still bandwidth and user population restrictions. Additionally, few products have been developed for FDDI-II, and IsoEnet products are still materializing at relatively high prices — about \$1,000 per user.

At best, IsoEnet is to be viewed as an interim solution while waiting for ATM, whose arrival should practically eliminate all the bandwidth and delay variation problems. One favorable aspect of IsoEnet is that it is based on ISDN-like concepts for bandwidth setup, allocation and release. This is consistent with the bandwidth setup, allocation and release in ATM, which is also being based on Integrated Services Digital Network.

The ATM Forum is working on an Audio Visual Multimedia Service that is scheduled to roll out late this year to mid-1995. This effort will result in the definition of multimedia conferencing and video distribution services optimized for the ATM cell-based environment.

These solutions should take advantage of the bandwidth capacities of ATM and its dynamic allocation and traffic management abilities. The work entails the carriage of MPEG-2 over an ATM Adaptation Layer for multimedia conferencing and video distribution.

The availability of an isochronous channel in IsoEnet and FDDI-II, as well as native circuit switching in ATM, are advantageous in terms of choosing wide-area facilities to internetwork multimedia LANs with remote LANs. For example, IsoEnet networks would be a good match for ISDN wide-area links, and ATM-based LANs could use cell relay services.

It is worth noting that interconnect equipment — such as bridges, routers and servers — and supporting protocols have been optimized over the years for bursty data applications. Buffer management, bus management and congestion management as they exist today are likely to make the delay variation even worse in an internetwork situation.

Other critical multimedia infrastructure

issues include NOS support and video servers.

On the NOS front, application program interfaces, remote procedure calls and other software-level capabilities optimized for video and multimedia usage need to be developed.

Video server technology supporting multimedia functions, especially in a workgroup/workflow context, is equally important. This entails providing for multimedia storage as well as access mechanisms for efficient information sharing, information transfer (including NOS aspects) and stream priorities.

Large video servers are being developed for commercial video-on-demand services. Video

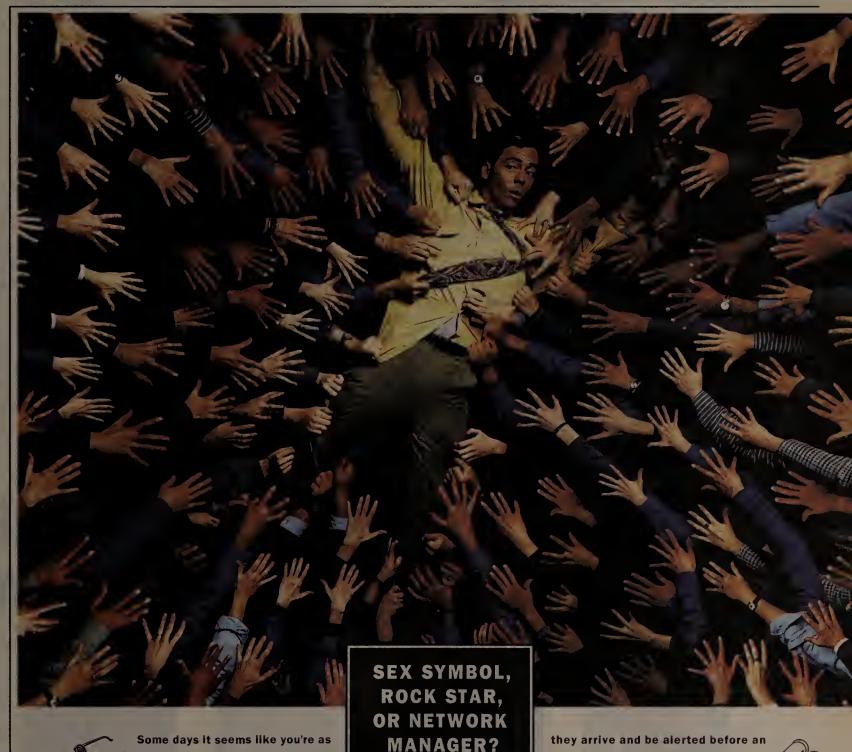
servers needed in the corporate context are siblings of these systems but may be more complex since they need to support interactivity from Day One, while many of the commercial video delivery products will only support oneway broadcasts for the foreseeable future.

Servers are available from IBM, Hewlett-Packard Co. and Network Connection, Inc. The latter, for example, recently introduced the Video Compression Station and the Symmetric Multiprocessing M2V Multimedia Video Superserver, which uses Microsoft Corp.'s Windows NT Advanced Server as the operating system.

All files are compressed and run at 30 frame/sec using MPEG-2 compression in the 1M to 5M bit/sec range. The MV2 supports Unix, Macintosh and IBM-compatible PCs, and can store and retrieve Intel Corp.'s Production Level Video, Digital Video Interactive, JPEG and Wavelet files, with resolution up to 1,024 by 768 pixels.

With a dash more of this, a sprinkle of that and a little more simmering, multimedia will be ready to serve up to the enterprise.

→ Minoli is a principal consultant at DVI Communications, Inc. in New York.



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# Interop bursting at the seams with LAN products

Backup systems, Internet access products among offerings to appear at the NetWorld+Interop show.

BY PEGGY WATT

If you're in the market for a new backup, fax or electronic mail server, chances are pretty good that you can find it at Net-World + Interop this week.

Vinca Corp., for example, is showing its Remote StandbyServer, a version of its fault-tolerant twinserver system that can be located miles from the main server.

The existing StandbyServer ensures up-to-date duplication of live data through mirroring or duplexing, and the new Remote StandbyServer performs the same task over dedicated or even dial-up wide-area links to remote servers, said Greg Brashier, Vinca's director of marketing.

The Remote StandbyServer, which uses an Open Internetworking Architecture interface card from Newport Systems Solutions, Inc., is intended to let businesses continue running if a server goes down, instead of having to resort to using an earlier version of their data.

"This data is complete to the last transaction," Brashier said. "Disaster recovery doesn't really mean I'll be automatically up and running immediately, but it means another machine is available with up-to-date critical business data."

In the case of companies with far-flung offices, the twin servers let MIS personnel at one site remotely update another office by sim-

ply updating the local system and then synchronizing the

The Remote StandbyServer is scheduled to ship in the fourth quarter and is priced at \$6,996 for the entire package. Current users of StandbyServer will be able to upgrade to the remote option.

Firefox Corp. is showing several additions to its Novix for NetWare product line, including a server-based Simple Mail Transfer Protocol (SMTP) E-mail gateway, a Macintosh version of the basic product and a LAN-based Internet connection.

Novix Mail for NetWare is a NetWare Loadable Module for NetWare 3 or 4 that supports SMTP and the Post Office Protocol 3. It is scheduled to ship in the fourth quarter and is priced on a concurrent user basis, beginning at \$750 for a five-user version.

Novix for Internet gives NetWare users access to Internet services without having to

load TCP/IP at each workstation or using a Unix system or IP router. The product supports telnet, ftp, Internet gophers, news readers and E-mail.

Novix Elite for Internet is a \$1,250 standalone version that supports five users; the \$650 Novix for Internet (also for five users) is for users that already have the Novix for NetWare product installed.

Both are scheduled to ship in the fourth quarter, as is Novix for Macintosh, a version of Firefox's base product that provides TCP/IP communications for Macintosh users on Net-Ware. The Macintosh product will be available in several versions comprising different combinations of modules and range in price from \$795 for the client/server implementation to \$1,500 for a workgroup version.

#### **MULTI-TECH SYSTEMS**

Multi-Tech Systems, Inc. is releasing the MultiExpressFax Servers, which can handle as many as eight simultaneous modem operations on IPX or Network Basic I/O System

The new line includes four models, ranging from a \$3,499 turnkey system built on a singleboard server to a software configuration that uses standard serial ports to send simultaneous faxes. The latter is priced at \$799 for four units.

Multi-Tech Systems' MultiModemManager system also now supports Simple Network Management Protocol, as well as password security and new call monitoring. Adding the new features to an existing Multi-ModemManager system costs \$499.

OVinca: (801) 223-3100; Firefox: (800) 230-6090; Multi-Tech Systems: (800) 328-9717.

# Hot products

Continued from page L1

group documents.

Under a file center, you can create folders to hold either tags or other folders. And folders can be nested to a depth of 20.

You can create as many Network Central file centers as you like, and access to each file center, folder and tag can be controlled for indi-

vidual users or through group membership.

Access can be defined as public, which allows anyone to read the tag and change the notes and tag name; shared, which limits access to the members of a group; or private, which restricts access to the owner of the file center, folder or tag.

Note that the security controls are to the tag data only. If an unauthorized user is not restricted through the regular network security services, only the tag is.

Tags are, as you might guess, more than just pointers. Because of the notes fields, tags are also a way of sharing information, such as "Jack, check these figures."

Tags also have visual signals, such as a bar beside the tag name, to indicate when the tag notes, other data or the file they point to have been updated. This lets users keep an eye on project files. Additionally, they include information on the person responsible for the file, the due date for the file and the file's priority.

Many users will start by building a folder structure under a file center either for their private view of files or for the workgroup to use.

The Network Central folder structure does not have to be organized in the same way that

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the disk subdirectories are laid out, although a one-for-one layout can be automatically created if required.

Once a folder layout is built, you can then start adding tags. Tags can be added either singly or as a batch using a file browser.

Files are then added to Network Central, and their tags are given default names, such as tag for: file name. Users can modify the default name to 64 characters, add descriptions of up to 127 characters and set the other data fields.

Tag notes can be extensive logs of user comments, and a single tag note can contain a total of 43K bytes of text divided into as many as 16K bytes per entry and up to 3,999 entries.

Once a file is tagged, users can examine its data employing the built-in viewer. The viewer supports many formats, including ASCII, hex, dBase, Paradox, Lotus, Excel, Microsoft Word, and even lists the contents of files in ZIP and LZH compressed formats.

Network Central can be configured to either view or launch a file when the file's tag is double-clicked; files can be found through a comprehensive search facility.

## **MONITORS AND HOT LISTS**

Another feature of Network Central is the ability to add folders called Directory Monitors. These folders watch a specified subdirectory for changes in specified files. The directory monitors update the file center through regular automatic scans.

Directory monitors are useful for tracking activity in shared network subdirectories.

Another tool is the Hot List, a small panel that can be set to float to the front of the Windows desktop. The Hot List contains tags that

are of particular interest to you for permanent display. When any change occurs to the files tagged on the Hot List, the status change is immediately visible.

Network Central also includes a reporting facility that allows you to print either summaries or the detail of any or all of the file center folders and tags. The entire database can also be exported in dBase format.

Network Central also supports the Vendor

Independent Messaging and Messaging Application Programming Interface electronic mail interfaces so files, tag data and reports can be distributed easily.

There are many environments where Network Central will make a big contribution to streamlining the flow of work.

For example, it can be used in any situation where regular reports are generated and need to

be tracked as well as updated. Network Central allows users to see when alterations have been made, and the tag notes would allow for changes to be logged.

As a project management system in which many files are being shared and updated, Network Central offers a strong framework for controlling and tracking work.

Even on a personal level, Network Central provides a comprehensive system for organizing files in an efficient manner.

Currently in its first release, Network Central promises to be a valuable tool for both personal and group use. Moreover, its pricing makes Network Central worth trying.

With it, you have no excuse for losing files.

The need to stay in contact with network support is an occupational hazard for network managers everywhere. No matter where they go or what they are doing, it often appears that only surgical intervention will separate the network manager from his pager.

So wouldn't it be useful if you could be paged by someone simply sending E-mail to an Internet address? How about if there was software that could intercept your incoming E-

mail on, say, Microsoft Mail and route selected messages to your pager?

Enter Notable Technologies, Inc.'s AirNote, which is based on an NEC America, Inc. Facts Provider pager with an 80-character alphanumeric display and 40message memory.

The Oakland, Calif., firm's offering consists of messaging software and a service that links

the Internet to the paging system. Air Note also offers all of the standard pager services, such as operator message taking, voice mail linked to pager and free headline news service.

#### **PAGING THE 'NET**

When the service is activated, you get a personal identification number, which becomes your user ID in AirNote's Internet domain (for example, 12345@airnote.net).

For free, AirNote also gives you an alias for the unmemorable numeric address (so your pager address becomes, say, fsmith@airnote.net).

AirNote also cleverly strips the Internet message header so all that gets sent to the pager are name, subject, the message and character count. Therefore, whenever anyone sends a message to your AirNote Internet address, the message is forwarded to your pager.

The AirNote system also comes with software for DOS, Windows and Macintosh operating systems.

The software, called Send Note, allows messages to be sent directly to the pager service via a modem.

#### **AUTONOTE FOR WINDOWS**

But the most interesting piece of software is AutoNote for Windows. This is a utility that intercepts Microsoft Mail, cc:Mail and Notes E-mail, and also checks it against some simple rules to see if it should be forwarded.

The rules include ignoring the message if it is only carbon copied to you and forwarding if the message is from specific people or if selected key words are present. If messages are to be sent, AutoNote dials the pager service directly and sends them.

If you want industrial-strength filtering and forwarding, AutoNote will not be enough, and an E-mail system, such as Banyan Systems, Inc.'s BeyondMail, would be more effective.

All considered, while AirNote is based on standard paging technology, the package as a whole is unique and provides maximum connectivity for a reasonable cost.

Now you will have absolutely no excuse for not being up-to-date on the latest network disaster back at base.

→ Gibbs is a consultant and writer in Ventura, Calif. He can be reached at (800) 622-1108, Ext. 504, or on the Internet at mgibbs@rain.org.

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# Is it time to run fiber to the desktop?

BY JOHN BIELAWSKI **AND CAROL HUTCHINSON** 

Recently completed standards for using optical fiber in horizontal cable runs indicate growing acceptance of fiber-to-the-desk. Affordable prices and product availability make it feasible and sensible to use fiber endto-end, especially given the tremendous growth in bandwidth requirements.

Consider Bellevue Hospital Center, a facil-

ity of New York City Health and Hospitals Corporation. Bellevue recently installed a fiberoptic backbone in its three-building complex

and will ultimately upgrade its existing horizontal copper cabling because it will not provide the bandwidth needed for the applications Bellevue has in mind.

With 1,232 beds and more than 5,500 employees, Bellevue Hospital Center is the second largest medical center in the New York

municipal system and among the busiest hospitals in the world. Every year, Bellevue handles more than 24,000 inpatient and 400,000

outpatient visits, as well as 80,000 emergency admissions. The hospital is also a leading center for medical education and research.

In 1991, Bellevue installed a fiber-optic backbone extending access to user and data servers to every floor in the facility. Today, anyone at Bellevue can tap into an Ethernet LAN.

The decision to install a fiber backbone was made for four primary reasons: the cable runs were too long for copper; fiber offered better network expansion potential; fiber is immune to electromagnetic interference (EMI) near electrical equipment; and fiber offered greater capacity for future applications.

Connecting one central computer to 46 wiring cabinets in three buildings included cable runs of more than 300 meters. "To run new copper those distances we would have had to put in electronic boosters," said Paul Serkin, Bellevue's MIS director. "Besides, with fiber, we could manage electronics from a central

Bellevue was also aware that installing fiber today would end worry over network expansion tomorrow. With three buildings interconnected by one fiber network, Bellevue can easily adapt to future additions.

"This will avoid cost down the road with more copper," said Angelo Quartuccia, senior project manager at Bellevue. "We'd have to add copper every time a system came in. With fiber, we can just tie onto a pair."

With this strategy in mind, Bellevue ran heavy-duty riser cable with 48 multimode fibers each to every building in the complex, with four to 12 fibers to each floor. These rugged cables, which can be installed with or without enclosures, are designed for intrabuilding and interbuilding environments. Ruggedness is an issue at Bellevue, where ongoing construction could endanger cables. For added safety, steel conduit was installed.

Fiber is terminated at 46 wiring cabinets spread throughout the hospital; however, only five cabinets are equipped with concentrators In the remaining 41 closets, fiber is terminated but currently unused. Like other installations, Bellevue's includes many "dark" fibers, to prevent costly cable runs when expansion is necessary.

Because it is dielectric, optical fiber is not affected by EMI, noise generated when stray electromagnetic fields. This was crucial at Bellevue, where cable travels through areas of high interference, such as radiology suites.

And finally, Bellevue was understandably concerned that bandwidth requirements for new applications could take giant leaps during the 10 to 20-year life of its cabling installation.

Serkin sees on the horizon a number of bandwidth-hungry applications, such as digitized X-rays, that make the choice of fiber in the backbone a natural. Their arrival will also increase the need for more bandwidth to the desktop.

"We expect to get into applications, such as digital imaging and transmission of X-rays to remote locations, that will not run over copper," Serkin said.

### **HORIZONTAL CABLE OPTIONS**

While the need to transport digitized X-rays may be unique to health care, computer-aided design and engineering are examples of applications in other industries that are stressing networks.

LANs have not kept up with other system resources. For example, personal computer disk drives offer transfer rates of up to 32M bit/sec; even low-end drives run at 16M bit/sec. Yet token-ring nets run at a maximum of 16M bit/sec, and Ethernet is even slower.

Also, a given workstation typically can transfer data at only 30% to 50% of the network's maximum capacity. Even low-end workstations cannot take full advantage of See Fiber, page L18

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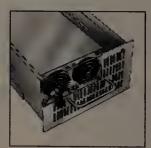
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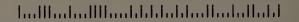
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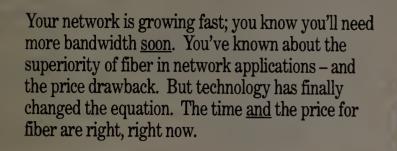
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Continued development and mass production of fiber-related components have driven their cost down as well.

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Circle Reader Service #4

# Analyzers

Continued from page L6

work interfaces simultaneously from local or remote locations. The device supports application modules for a variety of LAN technologies, including Ethernet, token-ring, Fiber Distributed Data Interface and Asynchronous Transfer Mode, as well as wide-area interfaces for frame relay, X.25 and Switched Multimegabit Data Services.

With Open-X, users can test links between traditional shared bandwidth LANs and

emerging ATM environments, as well as analyze traffic running between two remote LANs or a remote LAN and corporate headquarters.

A portable seven-slot version is also availible.

#### **FRONTLINE**

Frontline Test Equipment, Inc. will join the analyzer fray at NetWorld+Interop with Ethertest, a personal computer-based Ethernet LAN analyzer that allows net managers to measure and test net performance and analyze traffic patterns via protocol decoding.

Ethertest, which runs on any 80386-based

machine, includes a choice of a PCMCIA interface, parallel port adapters or an Industry Standard Architecture-based network interface card that connects the device to the network. The software also offers support for Protocol Definition Language, which allows users to define proprietary protocols.

#### WAVETEK

Wavetek Corp. this week will roll out a new line of portable cable testers designed to test and certify Category 5 unshielded twisted-pair wiring installations in 100-MHz networks that support ATM and other high-speed appli-

cations.

The LANtek Pro Series, which is available in basic and advanced versions, features an Autotest capability that runs a complete test sequence, including measurement of crosstalk at both ends of a cable, line mapping, DC loop resistance, mutual capacitance and cable length. A Dual NEXT feature reduces the time required to test two-way, near-end crosstalk in about 40 seconds.

©FTP Software: (508) 685-4000; Axon: (617) 630-9600; NAT: (408) 370-4300; Tekelec: (818) 880-5656; Frontline: (708) 575-8570; Wavetek: (619) 279-2955.

# Fiber

Continued from page L16

their potential speeds and capacities over today's networks. Soon designers may have to plan for speeds in the gigabit-per-second range.

Even with hardware and software solutions in place, however, voice-grade unshielded twisted-pair copper, which makes up the bulk of installed copper, incurs too much signal loss and cross talk to be used in high-speed applications. It has proved incapable of supporting sufficient distances, even with the addition of attenuation-reducing technology.

Standards for high-speed copper installations have been held up by technical issues regarding copper's ability to handle high speeds and still pass Federal Communications Commission Class B standards for radio-frequency emissions while also meeting Fiber Distributed Data Interface bit-error performance specifications.

A number of fixes are being tested in order to reduce radiation to acceptable levels. These include adding circuitry to network interface cards or using complex encoding schemes that allow the signal to be sent at lower speeds with the same effective data throughput.

But even if these work, potential customers cannot presume their installed copper is up to par. And because most existing wiring was not graded at installation, customers will have to test all their cables.

### THE FIBER SOLUTION

Network planners can install fiber to the desk now. Industry standards and affordable products are available today to support current networks, including Ethernet, token-ring and even low-speed asynchronous protocols. So a fiber-optic infrastructure can be implemented today, allowing for expected growth to higher speeds and bandwidth in the future. And the fiber you install today is the same fiber specified for high-speed protocols such as FDDI and Asynchronous Transfer Mode.

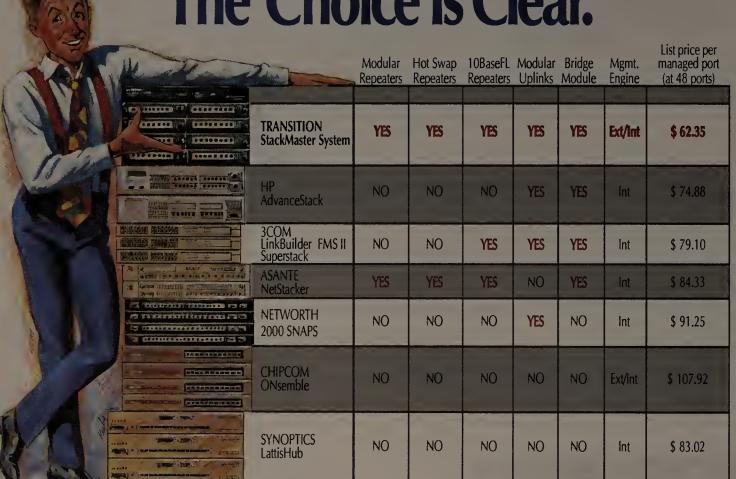
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12. With volumes going up, prices are falling.

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→ Bielawski is eastern regional sales manager for Berk-Tek, Inc., and Hutchinson is an applications engineer in Corning, Inc.'s Premises Wiring marketing group.

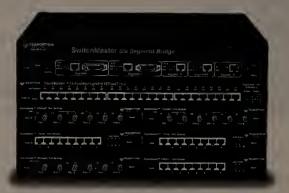
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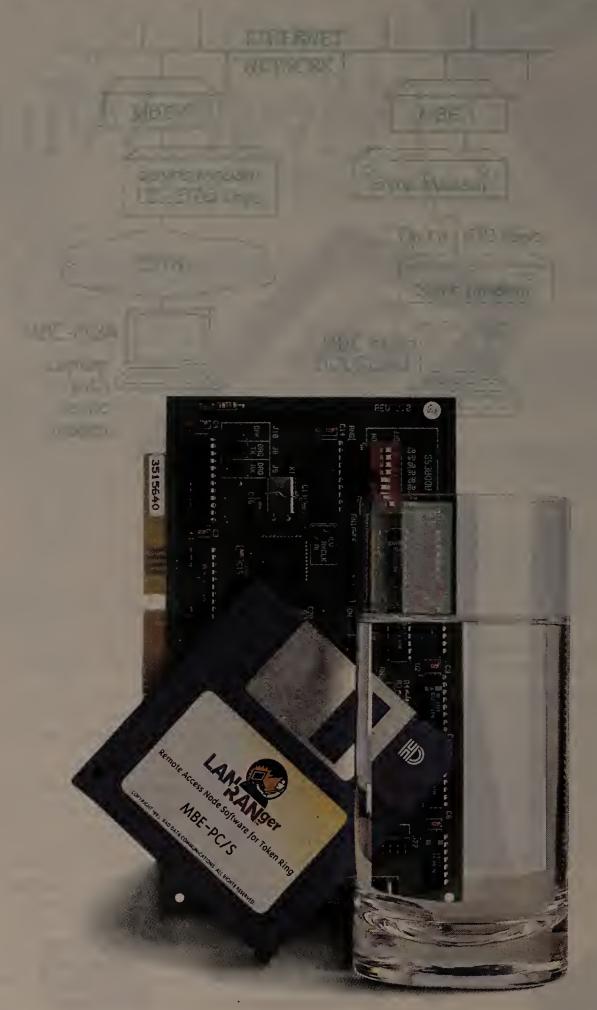
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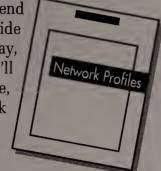
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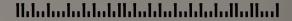
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# NET RESULTS

by Mark Gibbs

# Congress 'crazies' want to carve up telecom

ell, I survived. I've just moved my house and nothing actually went wrong. There should be an award for such things.

Out of the well-controlled (ha!) chaos of the move and the relocation of my net came several thoughts relevant to this column. But just as I was about to put virtual pen to electronic paper, a message came whizzing onto my desktop. This message was so astounding that all thoughts of my trials and tribulations faded into insignificance.

That august body, the Electronic Messaging Association (EMA), sends out alerts, and the latest, titled "Special edition: Changes to telecommunications deregulation legislation may

have adverse impact on messaging," dated Sept. 6, is rather disturbing.

This week Congress, returning after they fled from Washington for Labor Day, is scheduled to take final action on some mind-bending pieces of legislation. These bills are rather snappily called \$1.1822

pily called S.1822 (Hollings bill) and H.R.3626 (the integrated Brooks-Dingell/Markey-Fields bill).

The important issues here are best summarized by the guys at the EMA, who said, "When enacted, [there is very little likelihood at this point that they will not become law] it will produce the most significant changes to the telecom industry in over half a century."

There are a number of aspects to these changes. The first is that any employer, service provider or carrier of E-mail messages will be required to examine and manage (censor) the contents of communications or be liable for their failure to do so.

The intent is quite laudable in its objectives to prevent electronic stalking and minors from being exposed to pornography.

Now I could write reams on the rights of people to send what they please to whomever they please and for whomever to be equally pleased to read or delete the message upon sight.

But however nobel the aim, this demented legislation proposes achieving the goal by requiring employers, service providers and carriers to screen the contents of messages and files sent by employees and customers — including images.

Freedom-of-speech issues aside, it appears Congress hasn't considered the practical aspects of implementing the legislation. The problems associated with requiring companies to search all electronic transmissions (not just mail, but file transfers, as well) for dubious material are insurmountable.

It simply can't be done without seriously degrading the value of E-mail and file transfers, as well as degrading your ability to do business.

And the requirement that your company plays Big Brother ain't all that's in these bills. There's also the requirement for service providers to set aside 5% of capacity to give to

politically deserving groups (defined by whom?).

And the cost of this is to be borne by business — which is you.

The final piece of nonsense is that the legislation would also empower the Federal Communications Commission to begin setting standards in areas such as messaging, where it determined that industry standards making efforts (by groups such as ANSI, ISO, ITU and the IETF) were not moving quite fast enough. And there would be no requirement to ensure consistency with existing or developing standards.

Who in a million years could believe that a bunch of raving, pen-pushing bureaucrats like the FCC can manage something as complex and delicate as defining messaging standards.

If your blood is running cold, contact the EMA for the full story. You can get the group on the Internet at info@ema.org or, if you are communicationally disadvantaged, by fax at (703) 524-5558 or telephone at (703) 524-5550.

It all makes moving look like a lot of fun.

→ Gibbs is a consultant and writer based in Ventura, Calif. He can be reached at (800) 622-1108, Ext. 504, or on the Internet at mgibbs@rain.org.









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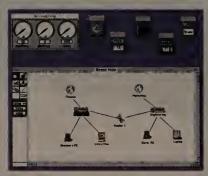


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## GLOBAL SERVICES

Voice, Data and Wireless Services, Regulatory Issues and Voice CPE

#### Frame relay nets, road warriors on collision course

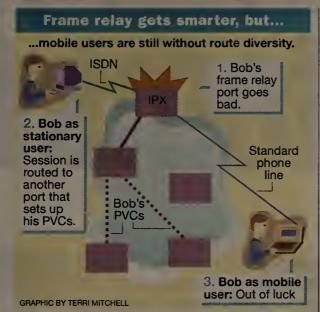
Early efforts are under way to resolve a technical disparity between two burgeoning areas of communications: frame relay and mobile networking.



Today's frame relay net services have been designed to accommodate stationary users who communicate across the carrier's network from a fixed location via dialup or dedicated lines. These nets have few provisions for

the proverbial road warrior, who is difficult to identify and authenticate when not connecting to the net from a predefined phone number.

But some early frame relay users are already think-



ing ahead to the need to marry mobile communications and frame relay nets.

"Signaling [that identifies] who you are should be embedded in the switch's software so I can dial a local port anywhere in the country," said Jim Fay, manager of strategic technology planning at PMI Mortgage

See Collision course, page 47

#### IXCs, others dangle the final ISDN carrot in front of the telcos

BY JOANIE WEXLER

By hook or by crook, ISDN will soon be forced into ubiquity.

Local phone companies that cited a lack of demand as the main reason for dragging their feet with ISDN are getting pressured by their biggest customers, the interexchange carriers (IXC).

The IXCs are now seeking local ISDN's caller ID, switched nature and speed to sell their own innovative services, such as frame relay, video interoperability and Internet access.

The IXC clout could be the impetus the regional Bell holding companies need to get serious about ISDN and, in the process, accommodate companies that have found local ISDN pickings slim for telecommuting, remote office, telemedicine and other applications.

#### AT&T SPEAKS OUT

For example, at the Desktop Video Conferencing show in Framingham,

Mass., late last month, Ernest DeNigris, vice president of AT&T's new multimedia WorldWorx Network Services, told a lunch crowd that the carrier is being forced to make the local exchange carriers provide

Users at the meeting expressed concern that they would not be able to use WorldWorx services due to a lack of ISDN access offerings, particularly in the NYNEX Corp. and South- DENIGRIS western Bell Corp. regions.

DeNigris said as part of the World-Worx offering, AT&T will take care of getting Basic Rate Interface access for users. AT&T is also exploring a form of bypass whereby it would install on the customer's premises a device that would break a 1.544M bit/sec AT&T Primary Rate Interface ISDN line into BRIs and deliver them directly to the user's desktop, he said.

Other vendors are also helping the cause. Intel Corp., which sells desktop collaborative video equipment under its ProShare line, has a program called Intel Blue — a simplified way for users to order ISDN lines tuned to Intel gear.

Intel has predefined the provisioning specs for marketing allies Ameritech Corp., Bell Atlantic Corp., Bell-South Corp. and Pacific Bell. Users can order ISDN, Intel gear and long-distance services from these companies

and get healthy discounts off ProShare.

There is evidence the carrot-dangling is paying off. Bell Atlantic recently accelerated its schedule for making ISDN links available to IXCs from 50% of its region to 100% by first-quarter 1995, said John Rudden, Bell Atlantic's manager of switched access services.

In addition, service providers are beginning to offer ISDN access into their frame relay nets to accommodate remote users and to gain efficiencies in their own networks that could result in cost savings passed off to customers (see

story, this page).

For example, CompuServe, Inc., said it is banking on ISDN to one day accommodate mobile users who will be able to get ISDN from any phone. A spokesman said CompuServe's recent pledge to support ISDN access into its Frame-NET service (NW, Sept. 5, page 6) was based largely on ISDN assurances from all the RBHCs.

Others with clout, such as state governments, are also turning up

the heat.

The Texas Public Utility Commission (PUC), for example, last month put on the table a proposed rule making that would require Southwestern Bell and GTE Corp. to offer ISDN throughout the state. The impetus: The state has agencies in 254 counties needing connectivity and a services budget of approximately \$200 million a year to pay for it, said John Fike, director of the Center for Telecommunications Technology Manage-

ment at Texas A&M University.

The center provides consulting to the state's PUC.

ISDN pundits in Texas are hoping for an ISDN rule by year end, Fike said.

#### **REGULATORY RATIONALE**

Charles Baker, president of Telecommunications Engineering, Inc., a Dallas consultancy, said looming regulatory changes will constitute the final ISDN push. The Communications Act of 1994 pending before the U.S. Senate "will probably take a lot of authority of the [PUCs] away," he said, "and most digital business services will come under FCC regulation."

The Federal Communications Commission, he said, wants consistent services deployed as a part of the federal government's plans for the Information Superhighway. 2

#### Let carriers assume your WAN worries

Service providers now present managed network offerings.

BY BILL BURCH

Washington, D.C.

If managing private lines, maintaining CPE and responding to system crashes have gotten to be too much, managed network services offered by carriers may be the ticket to reducing network headaches and freeing up staff for

strategic projects.

Today, the Big. Three long-distance carriers, regional Bell holding companies, WilTel, MFS Datanet, Inc. and others offer to take over router management as part of their managed net services. And the carriers are continually enhancing their services, the most recent being Sprint Corp. and US WEST, Inc. announcing support for 3Com Corp.'s remote access servers under their respective offerings (NW, Sept. 5, page 29).

"We're at a point in time where you don't have the nice traditional 'demarcs' that used to exist," said

John Dubret, senior vice president of information management for NationsBank Corp., the fourth largest U.S. banking company and an MCI Communications Corp.managed network customer.

For the user, a managed network service offers some solid advantages. The carrier supplies customer premises equipment such as routers and data service unit/channel service units and,

See WAN worries, page 46

#### BRIEFS

US WEST, Inc. last week petitioned the U.S. Court of Appeals for the District of Columbia to overturn the Federal Communications Commission's latest ruling on interconnection of phone company equipment. In June, the same appeals court threw out the FCC's policy requiring Bell operating companies to offer physical collocation of switching equipment to competitors, after which the FCC ordered the Bells to file virtual collocation tariffs. But US WEST contended the FCC order exempted Bells that would continue allowing physical collocation, indicating a strong continuing bias toward physical collocation.

As expected, **Houston** has joined the list of cities where cellular users won't be able to get a phone number in the regular area code. Starting March 1, Southwestern Bell Corp. will assign cellular numbers out of new area code 281, which will contain the same boundaries as area code 713. Current cel-

lular customers will be able to keep their 713 numbers, unlike customers in Chicago (NW, Aug. 29, page 28) and Los Angeles (NW, July 25, page 31) who are being forced to change the numbers.

AT&T has lowered its intraLATA toll rates in New Jersey to position them below Bell Atlantic **Corp.**'s rates. AT&T is telling users to dial its 10288 access code to override the presumption that Bell Atlantic will carry the call. AT&T said the rates when combined with other domestic and international calls for maximum discounts — will save users up to 20%, partly because it bills in six-second increments (30-second minimum) in contrast to Bell Atlantic's full-minute billing.

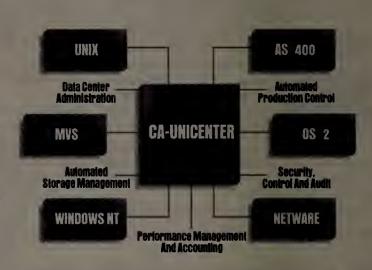
Sprint Corp.'s cellular division said it will deploy Code Division Multiple Access in its Las Vegas market in the fourth quarter of 1995. Sprint's conversion to the digital technology follows an interim migration to Narrowband Advanced Mobile Phone Service, a digitally enhanced analog technology.

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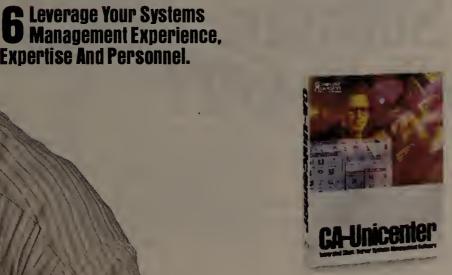
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#### Upgraded PBX add-on routes calls to virtually any location

BY DAVID ROHDE

Wilmington, Mass.

Priority Call Management, Inc. today plans to announce an enhanced version of its private branch exchange add-on that can route calls to virtually any location.

Analysts and network managers who

already use a predecessor to Priority's MSX System applaud it as more flexible and featurerich than so-called one-number routing systems being promoted by carriers.

Instead of employing special kinds of telephone numbers — such as those within the 500 area code set aside for one-number services -

the MSX ties all calls to an employee's regular telephone number.

If the employee is away from his or her desk, the system instructs the caller to hold while it pages the called party, who gets a readout of the originating telephone number on his or her pager. The employee can then call back into the MSX from any telephone to grab the

The new version adds the ability to call an off-site phone number, such as a cellular or home phone, and to accept faxes.

"I think this is a great idea," said Gary Andresen, principal analyst with Dataquest, Inc. in San Jose, Calif. While Priority Call Management is making the system available to end users immediately at a cost of \$60,000, Andresen predicted that PBX manufacturers will want to resell the system or develop one of

"This is the same thing that your switch manufacturers ought to be doing anyway, Andresen said. "[Priority] doesn't have a way to embed its software right in the PBX, so it's using an adjunct device.

The breadbox-sized MSX is based on an Intel Corp. 486 processor running SCO Unix. A T-1 connection is required between the PBX and MSX, said Andrew Dale, Priority's vice president of marketing and business develop-

When a call comes in and is not immediately answered, the caller is prompted to press 1 to speak to the called party, then receives a message saying that if the party is available, he or she will come on-line shortly.

MSX rings the called party not only at the desktop but also potentially at a home telephone and mobile phone, and can even page the called party. It can ring all numbers simultaneously or in a rapid sequence, depending on user preference.



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#### **Advantages of Priority's MSX System**

One number provides access to a user's desktop phone, cellular phone, fax and pager.

Uses regular telephone numbers instead of new special numbers.

Enables caller to wait until called party is located before being bounced to voice mail

Provides caller information to called party.

Reduces phone tag and voice mail jail, reducing toll charges.

If the called party does not get to a phone in time, he or she can listen live while the caller leaves a voice-mail message and can opt to intercept the call, much as many people do with their answering machines at home.

That should cut down on telephone tag, Andresen said. "Most people are trying not to answer all their calls," he said. "That's why voice mail is such a pain because they're using it to screen the calls."

System administrators can monitor and manage traffic from existing Simple Network Management Protocol systems.

#### **BOOSTED PRODUCTIVITY**

Even users of the more limited predecessor said the product has boosted productivity.

"Our goal was to eliminate the loudspeaker [paging system] in the building," said Kevin McWeeney, manager of network services for Progress Software Corp. in Bedford, Mass.

Eliminating missed connections within a single campus was a primary goal for the telecommunications manager at another company who did not want to be identified. "That's where a lot of my calls are missed," she said.

The system also eliminates the routine of having to assign pager numbers and their associated personal identification numbers, or PINs, this manager said.

"In fact, I don't even know what my pager number is," she said.

Priority Call Management: (508) 694-

#### Comments?

See "Contacts" box on page 2.

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#### WAN worries

Continued from page 41

with their bulk buying power, can secure lower prices and pass the savings on to users. A carrier can also hold down expenses with a common equipment pool to back up different customers' networks.

For companies considering a new technology such as frame relay, a managed network service can ease the transition, said Christine Heckart, senior consultant with TeleChoice, Inc. in Verona, N.J. A company can hire an experienced service provider to run the network for a year while the staff looks over the carrier's shoulder.

#### **DROPPING CONTRACTORS**

At NationsBank, signing up for a managed frame relay network with MCI meant a chance to drop networking contracts with other outside contractors, among other advantages.

#### Soup to nuts: Managed network services defined

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- Service management for local and long-distance carriers
- Ongoing network optimization
- ◆ Monthly performance reports, yearly network

#### Advantages:

- Lower capital costs
- Carrier handles support and maintenance
- Carrier tracks new technology
- Administrative and operational expenses
- Staff free to focus on company's strategic goals

#### Disadvantages:

- Tied to a single carrier
- Reduced bargaining leverage
- Limited array of services

Today, the bank is saving 20% on network operating expenses, according to Nations-Bank's Dubret. In addition, by working with a large carrier such as MCI, the bank is able to better keep up technology advancements.

"The advertised service lives [of equipment] tend to wind up shorter because so many technological advancements are occurring so rapidly," Dubret said.

Internal staff that had been running the network are now working on implementing client/server technology and enhancing databases and electronic libraries so the bank can cut the time it takes to complete some business processes, he said.

#### **ECLIPSE PICKS SPRINT**

Ray Meyers, MIS director for industrial burner manufacturer Eclipse, Inc. in Rockford, Ill., has also chosen a managed network

Eclipse had been running a network comprising 9.6K and 14.4K bit/sec dedicated and dial-up lines before it switched to a frame relay network from Sprint in December. Now it has links of at least 56K bit/sec to remote sites in Texas, Pennsylvania and Illinois. That enables Eclipse to tie in all end users at remote offices, instead of just a single terminal in each.

Remote management headaches were one reason Meyers decided to go with a managed network service. "It's very difficult to manage

something from afar," he said.

"Once you put these people in the position of depending on you, you don't have the option of saying, 'Oh, I'm sorry. The thing's broken. We'll have to try to get ahold of somebody to come in and diagnose your problem," "Meyers said. And Meyers couldn't cost-justify putting a WAN expert on staff.

Sprint took about 60 days to design and install the Eclipse network, and so far, he has been happy with the carrier.

Myers had been concerned about losing bargaining leverage when he turned over the network, but so far Sprint's been fair, he said.

As the carrier's second managed network customer, Meyers got free installation. Overall, Sprint's original bid for a managed network service was about what other carriers were quoting for transport alone.

Today, he's only paying \$100 more per month for managed network service to each site than he would for basic transport.

#### **KEEPING SOME LEVERAGE**

Moving to a managed network can have its downside, however.

For the user, being closely tied to a service provider means less bargaining leverage at contract time. To retain leverage, your threat to choose another carrier has to be credible, even if it means a wrenching shift away from a service provider that has gotten to know your network better than you do, said analyst Arthur Henley, vice president of Telecom Technolgies, Inc., a consultancy in Richardson, Texas.

At NationsBank, Dubret said he does not think he's lost any leverage with MCI by signing up for a three-year contract. The bank negotiated charges for adding additional sites up-front, so there is not much left to argue over there. As for the long term, the bank is still using services from other carriers.



#### Collision course

Continued from page 41

Insurance Co. in San Francisco, a WilTel frame relay customer.

'In the future, I'll want to get laptop frame relay. I should be able to dial any switch [in WilTel's net], identify who I am, and have anyone send information to me," Fay said.

Currently, though, frame relay networks map each user to a fixed port on a particular switch in the carrier's net. That port knows about all the permanent virtual circuits (PVC)

assigned to a given user, and it is not shared by other customers if not in use.

This is an inefficiency that could be solved if multiple customers could share carrier ports - an infrastructure issue that could deliver lower costs to customers, analysts said.

In the meantime, if a user moves away from his fixed location, he has to somehow hook up to his home port. This can be costly if he must make multiple long-distance calls back to that

And if the port or switch goes bad, today's networks are not yet smart enough to redirect the user to another part of the net that knows about his PVCs, said Tom Jones, president of New Venture Directions, Inc., a fast-packet consulting firm in McLean, Va.

#### WHAT'S ON TAP

AT&T addresses these issues in part with its Information Access Service option. Roving members of AT&T's frame relay service can dial 950-1-ATT from anywhere in the country and log on to the AT&T frame relay net using their password. The net then maps them back to their designated carrier switch port, said Kevin Brand, product manager for InterSpan frame relay services. This bypasses the cost of a long-distance call.

And AT&T's switch provider, StrataCom, Inc., has taken the first step toward resolving

the port sharing inefficiency. The company introduced its Intelligent Network Server (NW, Aug. 8, page 1), due out

late this year, which allows ISDN access into a frame relay net.

Using ISDN's signaling channel, the server can identify the calling source as an authorized participant in the frame relay net. Then it will map that source to any variety of ports and switches as warranted by time-of-day cost benefits or failed ports, links or equipment.

The server will also allow users to share ports and redirect users who find a port busy.

AT&T and CompuServe, Inc., another frame relay provider offering services off StrataCom gear, said they plan to support the StrataCom function soon after it becomes available. WilTel, which also runs an IPX net, said it is evaluating the server.

One analyst suggested StrataCom's port sharing functions might be combined with AT&T's ability to identify users on the road to satisfy mobile users' need for virtual ports, although the companies have made no announcements in that area.

And, since ISDN is not ubiquitous, Strata-Com's server — a front end to its IPX frame relay switch — is a bigger help to remote and telecommuting users in fixed locations than to the roaming worker of the virtual office.

#### STILL TO COME

Mobile workers cannot make use of ISDN's automatic number identification feature for two reasons: They can't count on getting ISDN everywhere, and ANI is associated with a calling source phone number, not a particular device or individual.

"Mobile workers have to be able to dial in from multiple locations," acknowledged Andrew Greenfield, a StrataCom product-line manager. "And that includes analog phone lines. For a mobile connection, the net must identify a user and know what [virtual] links they require."

He said the industry "does not have an answer to that yet."

However, he indicated StrataCom would one day address analog-to-frame relay calls with a switch function that converts analog signals to digital before passing them into the cloud. This would be an alternative to carriers having volumes of separate modems, which is more costly to them and their customers.

Also, there needs to be an identifier of some sort in the data stream to accommodate mobile users, said Jones, who sees no reason laptops and wireless personal communicators could not some day get outfitted with frame relay interfaces for direct connections that are even less expensive. The idea would be to outfit the portable device with a unique code and a communications protocol understood by the car-

Jack Blount, chief executive of Dallasbased MobileWare, Inc., a maker of client/server software for mobile users, said "caller ID is probably something we should look at," though he said his firm currently has nothing in development. "There is clearly no frame relay protocol to let you do that today."

Analysts said similar issues will crop up as Asynchronous Transfer Mode net services ramp up. However, they said, users are likely to retain their frame relay interfaces into the ATM net where conversion would take place because of the price/performance inefficien-



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"Primarily, we evaluated four routers — Cisco, Wellfleet, CrossCom, and Proteon — for SNA internetworking, IPX and IP capabilities.

"When it came to hardware configuration, Proteon provided extremely easy access. You could pop the cover off and readily change interfaces without having to string a bunch of cables. They provided flash memory for the operating system and configurations."

rations, so there was never any boot-



**BOB FISHER** is the Systems Analyst at First of America Services, Michigan.

ing off a diskette. The LEDs on the front panel were also very nice. A quick look would tell you whether a given interface was up or not. None of the other router vendors provided that. In terms of speed and efficiency, Proteon beat the others hands down. And as far as the overall support for different topologies, Proteon worked well with everything. Unlike other brands we tested, the Proteon router was a true gateway.

"Reliability was another major criteria for selecting First of America's new router. You see, if we can't service our customers, we're out of business. Our network ties together six hundred bank branches. These terminals simply can't go down. So choosing a router to carry this traffic wasn't a decision I took lightly. Proteon proved to have the reliability we need. And if any questions did arise, Proteon's support representatives were readily available and very knowledgeable.

"Our bank is in acquisition mode, so integration is critical. After any merger, we have to integrate new networks into ours while migrating their applications. Right off the bat, our routers have to support all kinds of topologies. By deploying the Proteon DNX router at regional sites, we were able to provide these locations with SNA support very quickly.

"In terms of overall technology and performance, I'd have to say the Proteon router is absolutely the best."

"No contest."

"Our router is incredibly easy to use."

"Proteon's reliability is second to none."

"We'll integrate any multiprotocol network."

"Amen."



For more details on the First of America story and our free Guide to Integrating SNA and Multiprotocol Networks, call 1-800-830-1300.

		Protocols in use:         □ SNA       □ Asynch         □ Bisynch       □ X.25         □ Novell SPX/IPX       □ TCP/IP         □ Other       □ NetBIOS			
Name Company	Title	LAN topologies installed? ☐ Token Ring ☐ Ethernet ☐ Other			
Address		Host system installed?			
City	State Zip	☐ AS/400 or S/36, S/38 ☐ IBM Mainfrar☐ DEC VAX ☐ Other			
Telephone ( )		Type of industry			

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#### Users share stories of **SMDS** and ATM turmoil

BY BILL BURCH

Atlanta

Still have doubts about SMDS and ATM?

You're not alone. Network managers from Signet Banking Corp. and the University of Chicago tomorrow will tell attendees at the NetWorld+Interop trade show here about problems they've experienced with the two services.

Mark Rawlyk, an internetworking officer with Signet in Richmond, Va., will speak to the SMDS Interest Group about the conversion of his company's data network to Switched Multimegabit Data Service, which began last summer. His conclusion: The service isn't as far along as it needs to be.

Instead of a single SMDS network, the bank this year finds itself with three separate metropolitan-area SMDS networks connected by

Bell Atlantic Corp. is providing SMDS in the local area with MCI Communications Corp. handling the long-distance portion. Plans called for connecting roughly 27 sites in Baltimore, the District of Columbia and Richmond for electronic mail, file transfers, peerto-peer and client/server networking, and user access to mainframe computers.

Work with Bell Atlantic went fairly smoothly, but Signet had a tougher time with MCI, Rawlyk said. Signet wanted to use its SMDS net as a production system, allowing customer service representatives to perform database queries in real time, for example.

But MCI wanted to move more slowly on SMDS, given that it was only offering the service on a limited-availability basis. The carrier originally agreed to bring up only two to three sites in each city, Rawlyk said, and to support the network only during regular business hours, which was not what Signet had in mind.

"What MCI or anybody who provides a service has to understand is that this is a production network," Rawlyk said. "You can't have 9-to-5 coverage; we need to have 7-by-24 coverage. If there's a problem, somebody needs to be available to fix it."

To get the bank's wide-area network running, Rawlyk connected the three metropolitan areas with a mesh network using private lines from MCI, an approach that costs the bank around \$8,000 per month. That fix works for now, but it's a less than optimal solution, Rawlyk said. "Now we have three separate SMDS networks," he said, instead of a true meshed SMDS net. "It's a little bit more of a management headache."

For its part, MCI said it addressed Rawlyk's concerns when it went to full, commercial service on June 30. Support is now available around the clock, the carrier is willing to take on all of Signet's sites, and it has T-3 networkto-network connections, according to William Callahan, senior manager of HyperStream

The carrier currently has commercial service in the Bell Atlantic territory, and expects to add coverage in BellSouth Corp.'s, GTE's and Pacific Bell's regions in the early part of the fourth quarter. In other local exchange carriers' regions, direct connections between user sites and MCI's SMDS network will be available in the fourth quarter, as well.

MCI has also given the bank a break on line charges incurred by running both SMDS and

its current private-line network, allowing the bank to continue operating the private lines as a backup to the SMDS connections.

That backup network is important to Rawlyk, who is not fully confident about MCI's SMDS service in the wide area.

Local SMDS has another fan at the University of Chicago, where SMDS beat out Asyn-

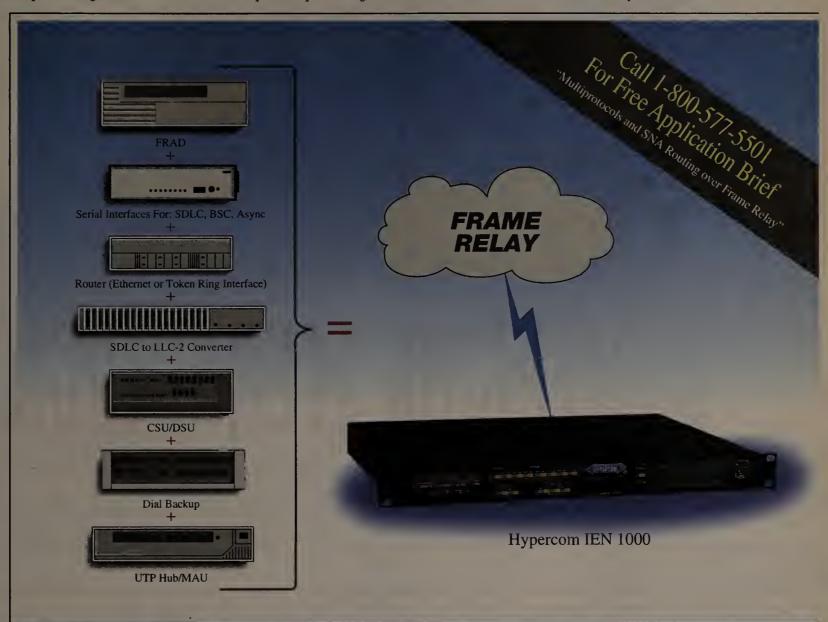
chronous Transfer Mode last week for a highspeed link between the University of Chicago and Argonne National Laboratory, a research facility west of Chicago that the school runs for the U.S. Department of Energy.

The university had been sending data to the lab over a private-line T-1 network it shares with other Midwestern universities, but gigabyte-size files were getting to be too much for the net to carry, according to Joe Mambretti, director of the office of strategic technologies at the University of Chicago. He will also address the SMDS

Interest Group this week.

To meet the throughput challenge, Mambretti decided on 34M bit/sec SMDS from Ameritech Advanced Data Services. Even though the university's connectivity needs may soon outstrip SMDS, as well, he said he is not yet ready to go to ATM.

"Our long-term plans do involve going to ATM; we see that as inevitable," Mambretti said. "However, the ATM standards are being implemented in different flavors by different vendors, and it's not clear to us at this 



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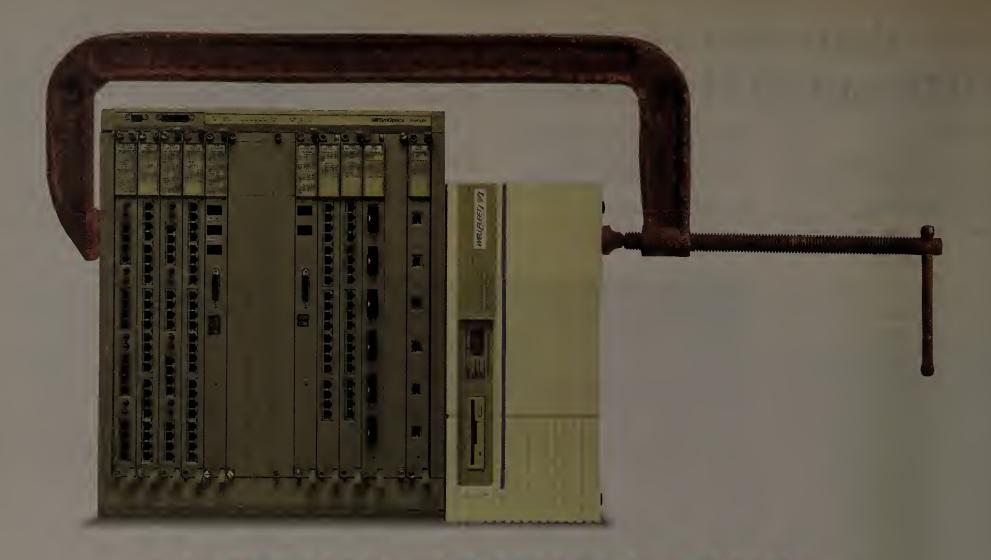
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# MERGING TECHNOLOGIES

Hub and router technologies are merging. Network management is no longer an option. ATM and packet switching will soon make virtual networking a reality. Let's face it, the networking industry is changing. And while those in the industry with incomplete solutions scramble to acquire the pieces they're missing, one company is already putting the puzzle together. That company is Cabletron Systems.

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# EMERGING TECHNOLOGIES



#### & TARIFF MON

by Eric Paulak

#### Why use private lines when you've got SMDS?

ow would you like to replace your private-line network with a data service that gives you the same bandwidth for a fraction of the

cost? It may sound too good to be true, but that's exactly what you get with Switched Multimegabit Data Service.

SMDS breaks up data transmissions and

sends them as separate packets. One advantage is that SMDS packets don't have to travel over a preassigned route, like a frame relay transmission does over a permanent virtual circuit. If you have SMDS, you can communicate with any other SMDS user. With frame relay, you can only communicate with others on your

Interstate SMDS doesn't have to be tariffed. MCI, however, provides a rate sheet for its HyperStream SMDS. Costs are broken down into local access, port charges and transport

Local access alternatives are private lines,

which run at speeds of 56/64K bit/sec to 45 bit/sec (T-3), and a local exchange carrier (LEC) SMDS service, with speeds ranging from 64K to 34M bit/sec. Costs vary by LEC.

Currently, MCI has deals to interconnect SMDS networks with Bell Atlantic, Bell South GTE and Pacific Bell. Ameritech and U WEST also offer SMDS, but MCI does not interconnect with their networks. And NYNEX and Southwestern Bell don't offer SMDS service. With these four carriers, your only option for local access is private lines.

Port charges are based on mode of access - privateline or local SMDS - and speed. For a DS1 (1.54M bit/sec) port with SMDS local access, the fee is \$250/month. For private-line access, the same DS1 port charge runs \$347/ month.

Transport fees are mileage- and mode of access-sen-

sitive, based on megabytes transmitted at one of two speeds - above 1.54M bit/sec or below 1.54M bit/sec.

For a 500-mile transmission at less than 1.54M bit/sec with private-line access at both ends, the cost is \$.0248 per megabyte of data. The same transmission at speeds higher than 1.54M bit/sec costs \$.0198 per megabyte.

If, however, that same transmission originates or ends over a LEC's SMDS service, there is an access and egress charge for every megabyte sent based on transmission speed. At 1.54M bit/sec, the access and egress charges are \$.006/megabyte each.

The transport portion also has minimum and maximum per-month charges based on access type and access speed. For 1.54M bit/sec dedicated access, the minimum monthly cost is \$696. The maximum you can be charged with that port speed and privateline access is \$1,740/month.

How does this compare to private lines? A five-node, fully meshed T-1 network costs \$58,250 a month. In this example, all sites connect with each other, for a total of 10 T-1s at \$2,520 apiece. It assumes 500-mile average distances between all sites (\$3.61/mile or \$18,050 total), plus an average of \$750 for access on each end of a T-1 (\$15,000).

The same five-node network using Hyper Stream SMDS and LEC-provided SMDS access would cost a grand total of \$9,175. That's \$250/port; \$935/site for a minimum usage requirement; plus an average of \$650/site for LEC SMDS access. Even with a \$3,037/mile maximum usage charge for DS1, the total would be no more than \$19,685.

There are some drawbacks to SMDS. MC is the only long-distance carrier offering inter-LATA SMDS, and SMDS can only be used for

While there is no doubt that SMDS is cheaper than private lines, some analysts consider it an unproven technology.

If you think the savings outweigh these possible drawbacks, go ahead and give SMDS a try. If it doesn't work, you're only out the cost of setting up one or two test sites.

- Paulak is associate publisher for the Center for Communications Management Information, a provider of rate and tariff information in Rockville, Md. He can be reached at (301) 816-8950, Ext. 327.



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## CLIENT/SERVER APPLICATIONS

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#### BRIEFS

Software AG of North America, Inc. is offering a trade-in discount for users who ditch their Ingres databases for Software AG's ADABAS D. The move is an attempt to capitalize on user uncertainty following the acquisition of Ingres by Computer Associates International, Inc. Customers who order before Dec. 31 will get a discount of up to \$100,000 on ADABAS D that equals the amount they paid for the Ingres Intelligent Database.

Software AG: (800) 423-2227.

Cadre Technologies, Inc. this week will announce a simulation tool for its ObjectTeam for Shlaer-Mellor, the company's object-oriented development tool product line. ObjectTeam/OOA Sim will let developers build an application, then run it through its paces in a simulated mode to verify their code and produce a prototype of the application. To be released during the fourth quarter for \$10,000 per server, it will run on Sun Microsystems, Inc.'s SunOS and Solaris, Hewlett-Packard Co.'s HP-UX, IBM's OS/2 and AIX, Silicon Graphics, Inc.'s Irix, and Digital Equipment Corp.'s AXP, OSF/1 and OpenVMS.

The **Electronic Messaging Association** (**EMA**) and a group of E-mail and telecommunications providers are testing a proposed standard for identifying **message file attachments**.

Under the tests, to continue through April, the various vendors will exchange messages with attachments tagged with the EMA's proposed File Transfer Body Part. This is an X.400-based identifier that contains information about the application that originally created the attachment. This identifier can then be used to call up applications to view or manipulate the attachment — or to create an error message.

The EMA and the vendors hope this will solve a growing problem with E-mail recipients being unable to open or figure out what to do with attachments.

EMA: (703) 524-5550.

Cadre: (401) 351-5950.

Motorola, Inc. has announced that it will use object-oriented tools from Iona Technologies, Ltd. of Dublin, Ireland, to build ground-control software for its Iridium satellite communications scheme. The move is a boost both for Iona, a small vendor part-owned by Sun Microsystems, Inc. and for the Common Object Request Broker Architecture on which Iona software is based.

Iona: (800) 672-4948.

Separately, Microsoft Corp., Digital Equipment Corp. and Iona rival Candle Corp. used a recent Object Management Group (OMG) meeting at Iona headquarters to introduce plans for integration of Microsoft's desktop object model with the OMG's Common Object Request Broker Architecture (CORBA).

The three companies urged the OMG to adopt a Candle specification that calls for software to link CORBA with Microsoft's Object Linking and Embedding technology and Common Object Model wire, or transport, protocol. The committee took no action.

# Firm finds big savings in mainframe data gateway

More cost-effective than extracting host information.

**BYBARBCOLE** 

DOLLAR

Indianapolis

Despite a companywide downsizing push, The Associated Group found it is sometimes less expensive to give employees

access to mainframe data through a gateway than to download the information into a local database server.

The Associated Group, a conglomerate of insurance and finan-

cial services companies here, is saving \$146,000 a year on a data warehouse application by letting end users access DB2 mainframe data from their personal computers with Sybase, Inc.'s OmniSQL Gateway.

A big chunk of the savings — some \$40,000 a year — stems from the a big reduction in mainframe connect time that is charged back to departments using the data warehouse application.

The company's experimentation with downsizing began six years ago when it built an application to electronically answer phone calls or route them to the appropriate subsidiary.

This application extracted DB2 claims data daily and stored it on an AT&T Global Information Solutions Unix system running Oracle Corp.'s relational database, which end users accessed from their PCs. While the application worked well, it was expensive to maintain.

Faced with the prospect of building a

plugging the mainframe was not an option.

Data warehousing involves placing data on mid-range or mainframe servers that analysts query for decision support purposes. In this case, the data resided on an IBM 3090 mainframe, and a series of PowerBuilder applications and spreadsheets would enable end users to do actuarial forecasts, underwriting analysis and financial modeling based on the data from their PCs.

After doing the math, the company opted to use OmniSQL and allow end users to directly access DB2 (see graphic). The figures were so compelling, the company also decided to convert the phone call application to OmniSQL.

Database server vs. gateway								
Database server	Gateway							
Cost to develop mainframe extracts\$100,000	Hardware costs/ maintenance fees\$12,000							
Operations staff (10 hours/week)10,000	OmniSQL license/ maintenance fees 45,000							
Mainframe chargebacks60,000								
Hardware costs/ maintenance fees48,000	Installation and administration of OmniSQL 20,000							
Database license/ maintenance fees15,000	Mainframe chargebacks10,000							
Total cost per year\$233,000	Total cost per year\$ 87,000							

new data warehouse application that would access even more DB2 data, The Associated Group compared the cost of downloading DB2 data to a Unix-based server using a gateway to access it directly. Since the mainframe was running other applications, un-

The OmniSQL Gateway runs on a Sun Microsystems, Inc. SPARC 10 Model 40. End users connect to the OmniSQL server over TCP/IP through Open Client software that resides on their machines. OmniSQL See Money, page 62

#### **APPLICATION DEVELOPMENT**

# Software AG to expand client/server presence

BY KEVIN FOGARTY

Software AG of North America, Inc. plans to beef up its Natural application development language by adding a workflow element and security features, tying in middleware and adding hooks to systems management applications

The workflow component will come from an unnamed third party and will help groups of programmers work together by enhancing maintenance and version control in team development projects, according to David MacSwain, senior vice president of marketing and technology at the company. The workflowenabled Natural should ship around the middle of next year, MacSwain said.

What, specifically, the workflow version will be

able to do is still up in the air. But likely functions will include the ability to monitor the number of lines of code a team writes, track test results and monitor how closely a team adhered to its development schedule, according to MacSwain.

See Software AG, page 60

#### Aiming for the enterprise

Software AG is updating its product line with the following enhancements:

Workflow-enabled Natural application tool for integrating team development efforts.

APIs to link Natural applications to systems management software.

Natural hooks to IBM and Digital message-oriented middleware.

Beefed-up capabilities for ADABAS D database.

Extensions that allow Visual Basic applications to access Software AG's Network middleware.

# Ease of use and management top DCE futures list

BY ADAM GAFFIN

Bosto

Distributed applications will become easier to develop and manage under proposals being considered by the Open Software Foundation, Inc. (OSF) to enhance its Distributed Computing Environment (DCE) technology.

Features that could be added to DCE by late 1995 or early 1996 include support for Simple Network Management Protocol, application program interfaces (API) for object-oriented programming, and integration with similar network services from Novell, Inc. (NW, Aug. 29. page 4) and Sun Microsystems, Inc., according to OSF officials at the DCE Developers Conference here.

In the future, DCE will also add the ability to use authentication and security services different from the Kerberos technology now in DCE, they said.

Within a few weeks, the OSF is expected to release a preliminary plan for DCE 1.2, which will build on the security and management functions going into DCE 1.1 and possibly ship in late 1995 or early 1996. DCE 1.1 itself is set to ship in November.

DCE consists of a set of network functions, including security, remote procedure calls and directory services, that can be used for creating enterprise applica-See DCE, page 64

bee DCL, page 0.

#### IBM users hit client/server hurdles

Roundtable participants discuss ways to boost performance of sluggish apps.

BY BARB COLE

New York

IBM customers downsizing mainframe applications to client/server environments have discovered that it is possible to build high-performance applications, but it's not easy.

IBM users who gathered here recently for a roundtable discussion devoted to improving performance of client/server systems are tak-

ing a variety of steps to combat sluggish applications. Those steps include placing more application logic on servers, storing retrieved SQL data at the client and redesigning screens to give users better response times.

Joe Correira, vice president of information engineering at Travelers Insurance Co. in Hartford, Conn., told other users that putting application logic on a server, rather than individual clients, can improve performance for certain applications.

"If part of the application is unique to me, it's at my client," he said. "If many of us are going to use it, I like to see it on the server.

But that logic does not always hold true. Running application logic on remote servers can be a problem, Correira said. "Dialing in to remote servers is really not an option. When



users dial in, they expect the same performance they get when they're plugged in, and you really can't get that," he said.

Other users explained how they have redesigned applications to make them easier to use and to yield better response times.

"In our application, users would have nine windows open and get frustrated," said J.P. Kichak, director of information systems at the University of North Carolina Hospitals in Carrbaro. He built a client/server system that gives about 300 doctors and nurses access to patient information and hospital research data.

In a recent release of his medical application, Kichak created icons for accessing patient data and specific areas, such as lab information and radiology. This minimized confusion and improved response time.

Kichak also minimized net traffic by storing certain data retrieved from servers at the client.



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#### Dark side of downsizing?

88% of client/server applications have to be redesigned or rearchitected.

68% of client/server applications took longer to implement than expected.

55% of client/server applications cost more than expected.

SOURCE: IBM CONSULTING GROUP, WHITE PLAINS, N.Y.

"Once we make a call to a SQL database and bring data back up, we keep it in memory at the client machine because nine out of ten times, a user will go back for that same data," Kichak said. He built a logging mechanism that keeps track of every server request a user makes. That data is stored in a DB2 table. Kichak said he uses that information to build a better path to the data for end users.

Despite attempts to make client/server applications more efficient, users complained that some applications, such as electronic mail, rarely perform well in a networked environment.

"No matter how much we tried, we cannot get E-mail to perform satisfactorily. It takes a long time to make a dynamic logon to a Novell server to get access to our E-mail system," Kichak said. He disconnected the company's E-mail system, and now users send messages via a company bulletin board.

While performance issues concern them, IBM customers said what is really needed is a messaging system that links client/server applications with their data sources.

"'We have front ends, servers and middleware. What we really need is a message layer to integrate those three and the ability to drag and drop data between them," Correira said.

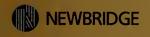
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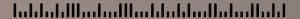
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**NET STRATEGY** 

#### Users cite key factors in client/server success

BY MARTIN LAMONICA

Migration to a client/server architecture is a business decision, not a technology decision, according to early implementors and other Shattering the glasshouse mentality, they said that business interests, such as cost savings or organizational flexibility, should guide all information systems (IS) projects.

"In the first phase of any project, [an IS executive has to talk strictly business - then, over time, you get into the technology," said Manfred Kruger, head of information technology and standards at Nestle S.A., a \$39 billion global conglomerate. Top management is more likely to provide adequate financing if IS departments set out to solve business problems from the start, he added.

Indeed, adoption of client/server systems is often viewed as a first — and often risky — step in a full-fledged reengineering of business processes. IS organizations must embrace a completely different corporate culture of sharing and decentralization, as well as toss out the control and predictable nature associated with

mainframe systems, users said.

"Strategic advantage is the leverage of knowledge. Five percent of getting that is bits and bytes. The other 95% is sharing information," said Tom Peters, whose books on organizational and management techniques advocate a disintegration of corporate structures to fully empower employees.

Peters went so far as to say that a company' organizational chart should look like a Jackson Pollack painting, with drips of paint splattered haphazardly, like a plate of spaghetti. Innova tion in corporations originates from unshack led employees on the fringes of an enterprise.

But end users with experience implement ing client/server systems disagreed. Decen tralization and pushing information - and power - away from headquarters is a good model, but a corporation needs a welldesigned IS structure that eliminates functional and data redundancies, plus provides a basis for future growth, they said.

"Once you're in distributed computing there's no way to know how far you'll go [i becoming decentralized]. But you should spend the time and

"There's no simple stamp-out formula in client/server, not any more than there was in the mainframe world," Shelby said.

money to coordinate and, at the very minimum, examine the data structures span the business," said Tom Robben, vice president of IS architecture at J.P. Morgan & Company, Inc., a large New York bank.

Robben advocated defining the corporation's core data and allowing different organizations to access it. This idea should extend to applications so that many of the enterprise's different functions are also shared across the enterprise. This, along with a database listing the business' priorities, eliminates a great deal of complexity and redundancy, he said.

Like Robben, other experienced users recommend breaking down business processes into the smallest units and creating an IS that accommodates newly developed programs as they become available. Rather than multiyear, monolithic applications, developers should

write smaller programs for specific functions.

"If you can't split the development project into discrete projects, you haven't identified, targeted or thought through your business goals sufficiently," said Ron Shelby, who led Connecticut Mutual Life Insurance Co. in a reengineering of its customer service group.

Users agreed that no single architecture or development tool can act as a silver bullet. "There's no simple stamp-it-out formula in client/server, not any more than there was in the mainframe world," Shelby said.

Moreover, there is debate on whether client/server computing is even ready for prime time. "There is overwhelming evidence that client/server does not save money," said Richard Finkelstein, president of Performance Computing, Inc., in Chicago.

A fundamental problem with client/server, he added, is products from different vendors are not designed to work together or rarely integrate well. Also, building a computer sys tem on Windows, which is inherently unstable, will create an unstable system, he said.



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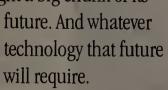
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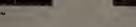
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#### Vendors unleash management, development tools for Oracle

Third parties roll out CASE and auditing software.

BY BARB COLE

Two companies recently rolled out development and management tools that work with Oracle Corp. databases.

cle Edition of the Visible Analyst Workbench (VAW), a version of the company's Open CASE Repository application design and data modeling tool that works with Oracle databases.

Developers may modify Oracle databases

using VAW's reverse engineering capabilities. VAW includes a code generator and interfaces to front-end development tools such as Powersoft Corp.'s PowerBuilder.

With the Oracle Edition of the Visible Analyst Workbench, the repository resides directly in an Oracle7 database and uses Oracle's database technology as a file management system. Most computer-aided software engineering tools use proprietary database technology to manage their repositories.

Visible said that by integrating VAW with Oracle databases, developers will be able to ing applications with VAW.

Available now, Visible Analyst Workbench Oracle Edition costs \$1,995.

In a separate announcement, Braintree Technology, Inc. announced SQL Secure Audit Trail Manager, an audit analysis tool for Oracle7 databases running on Unix or Digital Equipment Corp.'s OpenVMS.

SQL Secure is client/server software that runs on Unix and VMS, and has a Windows client interface. It allows database administrators to monitor database usage, user logons, user privileges and connect time, among other

It also supports graphical, tabular and userdefined reports.

SQL Secure helps administrators keep disk space requirements under control by automating the periodic archival of selected audit information to near or off-line storage, the com-

Available now, SQL Secure costs \$7,500 per server. Site licenses can be obtained.

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#### Software AG

Continued from page 55

It could also launch test applications automatically or provide specialized tools at predetermined stages of application development, MacSwain said.

The company will announce next year that it will partner with systems management vendors such as Hewlett-Packard Co. and Computer Associates International, Inc. to add hooks to link Natural applications with Open-View and CA-Unicenter, respectively, as well

as possibly other systems management products, according to Mac-

Swain. Software AG will write to published application program faces from several systems managevendors, ment rather than entering a proprietary relationship with one vendor, Mac-Swain said.

Software AG is talking to systems management vendors to add hooks to **link Natural** applications with OpenView and **CA-Unicenter**, respectively.

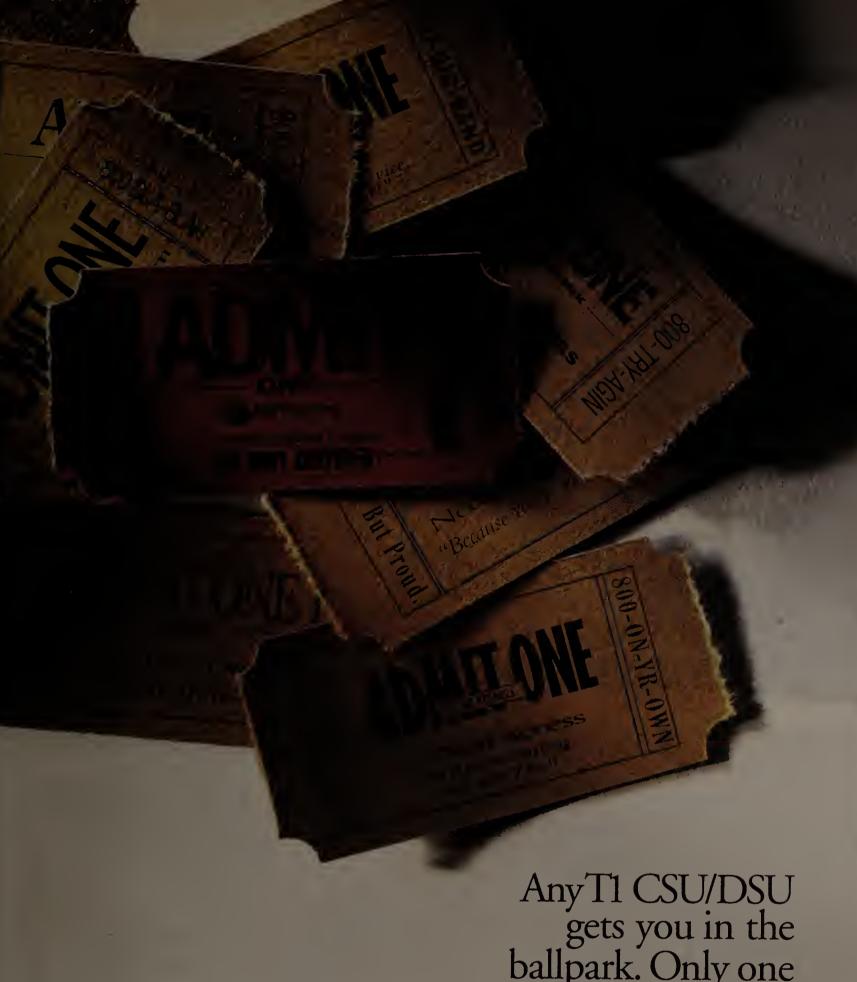
It will also build in hooks to message-oriented middleware from IBM and, possibly, Digital Equipment Corp. that will let Natural applications run across multiple networks and access other applications.

The company is also beta-testing Natural Security, a server-based security application for Natural software. It will be released by year end for various flavors of Unix.

The company also plans the following ennancements and new products:

- Its ADABAS D Version 3.1.2, which will be released this month, will support Microsoft Corp.'s Open Database Connectivity. Version 3.1.3, which will be released at the end of next year's first quarter, will include two-phase commit, partitioning of queries and a single logical view of data.
- It will create a Visual Basic extension so any application built in Microsoft's Visual Basic can access Software AG's Network middleware tool. It will be released by mid- to late





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# IBM puts message-oriented middleware in the spotlight

BY KEVIN FOGARTY

In the first of a series of announcements designed to raise the profile of its MQSeries message-oriented middleware, IBM last week said it would integrate MQSeries with Peer-Logic, Inc.'s Pipes Platforms middleware product.

IBM also has other moves in mind that will make MQSeries its main method of linking disparate applications across heterogeneous networks (NW, Sept. 5, page 6). These include acquiring the ezBridge code from Apertus Technologies, Inc. that is the base of MQSeries, and integrating MQSeries with other IBM workflow, messaging and transaction process-

ing products.

MQSeries is a messaging and queuing application that stores messages from one application or database, such as activity calls, in queues and forwards them to other applications across a range of network protocols.

Pipes is a message-oriented middleware product that delivers messages synchronously across networks. It includes dynamic name space technology, a complex distributed directory that keeps track of all Pipes-enabled nodes on a network.

By linking the two products, users get the

high-level messaging and queuing of the MQSeries with a communications layer that is easier to use than that in MQSeries, said John

Mann, analyst at The Yankee Group in Boston.

That will let users link other wise incompatible applications or replicate databases across disparate

networks more easily. They can move a server from one network address to another without manually telling each MQSeries-enabled server and application about the move, for example, Mann said.

MQSeries communicates across different networks and operating systems by messaging from one queue to another. Servers maintain these store-and-forward queues, which transmit messages among applications using the MQSeries application program interface. They also store a copy of each message until the application confirms that the message has been delivered.

To communicate, MQSeries queues must maintain a list mapping out the other queues that exist and their network addresses. Users have to create and update these tables manually, copying them to each MQSeries-enabled node every time there is a change in the table.

Pipes handles that automatically, which will relieve MQSeries administrators of a major management task, said Peter Tait, director of product planning at Peer Logic.

Pipes maintains a dynamic list of the net nodes that are running Pipes. Each time a node is moved or a new one is added, the changed node sends a message to the other nodes identifying itself and giving its new address.

"Using Pipes is like having agents that deliver messages on each other's behalf and keep track of each other," Mann said.

Tait said customers will not see the fruits of the joint venture until at least next year, probably in the second quarter.

IBM and PeerLogic are working on ways to let MQSeries use Pipes' Dynamic name space. Product iteration may only let MQSeries use Pipes as a transport mechanism, without access to the Dynamic name space, Tait said.

©PeerLogic: (415) 626-4545; IBM: (800) 426-2255.

#### Money

Continued from page 55

links to the mainframe through an Open Server application program interface that is loaded on the SPARC.

OmniSQL gives users transparent access to the DB2 data and can perform joins of main frame data and return the results to end users.

Performance of the Oracle-based data warehouse and the OmniSQL-based application is about the same, according to the company. With the OmniSQL system, however, users have more opportunities to bog down the net with large queries since they have virtually limitless access to mainframe data. That would not happen with the database server since users could only access the extracts downloaded to that machine.

While the company is sure it will immediately save a substantial sum using the gateway the potential for even greater cost saving exists because The Associated Group can develop other applications that share the OmniSQL Gateway.

#### Comments?

See "Contacts" box on page 2.



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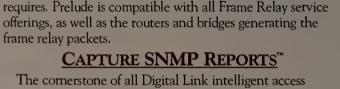
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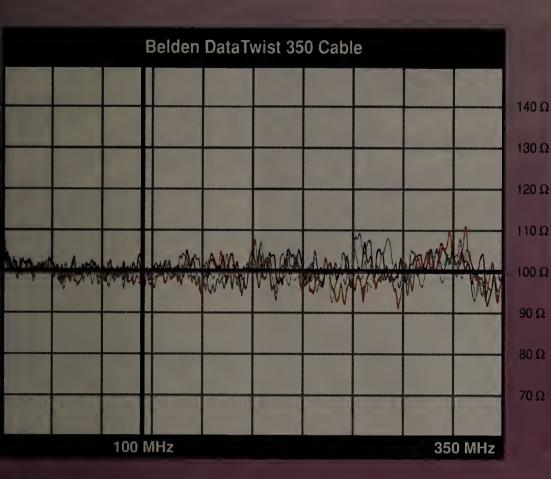


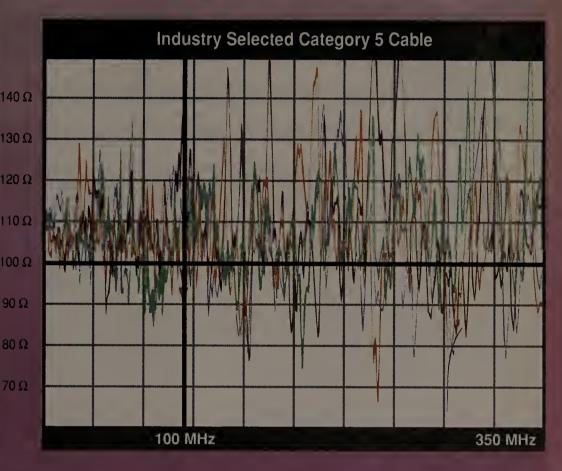
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#### Adobe hopes users flip over new Acrobat

BY ADAM GAFFIN

Adobe Systems, Inc. this week will release an enhanced version of its Acrobat document exchange software that makes it easier for users to integrate homegrown applications with Acrobat and offers new information indexing features and fonts.

The Acrobat product line is a set of client/server document management applications that let users create documents and distribute them throughout a network while maintaining the same format and fonts.

Adobe Acrobat lets users encapsulate documents and graphics in a format they can share across a network, regardless of which applications they are using.

Responding to one of the key complaints about Version 1.0, the company will also release free viewer software, said Gary Cosimini, business development manager for Adobe. Acrobat Reader will run on Macintosh, Windows, DOS and Sun Microsystems, Inc. Solaris workstations, and let users view Acrobat documents without running all of Acrobat.

It now comes with a set of application program interfaces (API) that let developers integrate Acrobat with other applications, such as Lotus Development Corp.'s Notes.

The APIs also will make it much easier to integrate Acrobat in custom-designed applications, said Gary Shifflett, network manager for the procedures department of the North Anna Nuclear Power Station, which is owned by Virginia Power.

It also supports Microsoft Corp.'s Object Linking and Embedding (OLE) 2.0, both for embedding objects and for creating links to other OLE 2.0 applications.

The APIs will also let developers link the Acrobat viewer with World-Wide Web servers

The \$195 Acrobat 2.0, expected to ship by October, will support viewers on DOS, Windows, Macintosh and Solaris platforms. The \$595 Acrobat Pro package includes Acrobat 2.0 and the Distiller application for translating Postscript files into Acrobat formatted files.

Acrobat for Workgroups adds an indexing feature that lets a developer create full-text indexes as well as licenses for 10 users, starting at \$1,595 per copy.

②Adobe: (415) 961-4400.

Continued from page 55

tions across a heterogeneous network.

OSF officials emphasized that some of DCE 1.2's proposed features could be pushed into even later versions. But there is an immediate need to make DCE easier to use, they said.

"DCE today is not trivial to learn," said Joseph Pato, the head of an OSF task force looking at DCE's future and chief architect of DCE applications for Hewlett-Packard Co.

#### The future of DCE

#### Potential enhancements include:

- SNMP Management Information Base
- Automated backup/restore
- NetWare and TCP/IP integration
- Object-oriented development tools
- Larger directory cells
- Support for multiple authentication

William Estrem, project leader for information architecture at 3M Co. in St. Paul, Minn., and a member of Pato's committee, said users are asking for greater programming ease and scalability. At a recent DCE user group meeting, application management ranked only fourth or fifth among top concerns, he said.

Easier programming will likely come through enhancements to the DCE Interface Definition Language, as well as an object model and C++ APIs that would make it easier to build DCE applications with object-oriented development tools.

Even though management did not rank especially high on users' wish lists, the OSF may work on a Management Information Base that would allow monitoring of DCE applications from an SNMP console. Version 1.1 lays the groundwork for this by creating a single interface for a variety of DCE monitoring tools. Another key feature would be automated backup and restore functions, Pato said.

The OSF planned SNMP support as part of its Distributed Management Environment, which it dramatically scaled back last year.

Some vendors are not waiting. At the conference, HaL Software Systems of Austin, Texas, demonstrated DCE management tools for Digital Equipment Corp.'s OSF/1 Unix variant and OpenVMS that will let users manage a variety of DCE functions across a network. IBM, meanwhile, demonstrated software that would let users of its NetView/6000 management system check the status and load-



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#### EDITORIAL

#### An efficient dictatorship

During the past few years, Microsoft has asserted its power in the desktop arena to establish a variety of connectivity specifications that are having a profound impact on the marketplace and your client/server network plans.

These specs, which are rapidly becoming de facto desktop network standards, include the Open Database Connectivity protocol, the Messaging Application Programming Interface and Object Linking and Embedding technology. Among other things, Microsoft is also working with Intel to develop specifications for computer/telephony applications.

No one doubts that Microsoft has positioned itself as an arbiter of "standards." The question is whether Microsoft's control over network specifications is unhealthy, as we explore in a three-part series beginning this week on page 1.

Customer reaction is mixed, based on our survey of 200 readers.

A big group of readers (42%) said Microsoft has too much control in setting network specifications. An almost equal number (43%) said they believe the company uses its standards power to gain an unfair advantage over competitors. Nearly two-thirds of survey respondents said Microsoft's specifications are too Windows-centric.

But nearly 70% also agreed that Microsoft serves customer needs in a more timely fashion by establishing its own specifications rather than waiting for official bodies to develop standards. And nearly two-thirds said Microsoft's standards-setting power is not a problem for customers.

Why the split?

Some people seem willing to accept Microsoft's "efficient dictatorship," as one analyst described the situation, in return for workable solutions to their networking problems. Many users are frustrated by the sluggish traditional standards process and welcome any progress toward interoperability.

But they realize that Microsoft's Windows-centric standards can only take them so far. Windows is the centerpiece of the Microsoft world, but Windows is only one piece of the networking world that customers have to manage each day. Customers are looking for broader answers.

They also have a healthy fear of being locked in to one vendor's proprietary plans. IBM was an efficient dictator of standards, but users are still feeling the pain of extricating themselves from that company's rigid architectures. That may explain why so few readers surveyed have actually adopted Microsoft's specifications as corporate standards (16%).

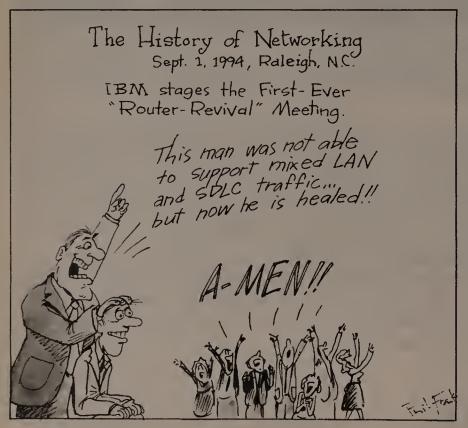
The best approach, it seems, is to view Microsoft's offerings as tactical solutions that can play an important, but not overriding, role in your strategic network plan, which has to encompass a wide range of systems and applications. And realize that only pressure from customers like you can push Microsoft to expand its interoperability solutions beyond the Windows desktop.

→ JOHN GALLANT

jgallant@world.std.com

#### TELETOONS

FRANK AND TROISE



#### THE BLUE VIEW

by Anura Guruge

# More than token solutions for users' LAN blues

y the spring of 1995, IBM customers are going to have great difficulty choosing among the various local-area network options that will suddenly become available to them. Despite the initial angst and disarray that will accompany this plethora of choices, this will indeed be a welcome — and long overdue — change for the better.

The current regime, where token ring is synonymous with IBM, has become much too restrictive and expensive. IBM users have not been able to enjoy the dramatically declining LAN prices (both for adapters

and hub ports) and increased functionality (offered by products such as port-to-port intelligent switching hubs) that the non-IBM segment of the market currently enjoys. This demarcation between IBM and the rest of the world when it comes to LANs will soon be history.

Asynchronous Transfer Mode (ATM) to the desktop, as postulated by IBM's provocatively low-priced 25M bit/sec Turboways adapter for PCs, is not going to be the only option to today's 4M and 16M bit/sec token-ring networks. Ethernet is already an option.

Before year end, enhancements will become available that could turn users' current token-ring networks into switching and full-duplex token rings—without requiring users to upgrade all of their PC/workstation adapters. The IEEE 802.12-based 100Base-VG/AnyLAN technology for supporting token-ring frames at 100M bit/sec, which is being promoted by Hewlett-Packard Co., IBM and Proteon, Inc., among others, will also be available early next year.

Thus, users have, or will soon have, the following LAN options to choose from: Ethernet, including enhancements such as 100M bit/sec Fast Ethernet; token-ring enhancements; 100M bits/sec AnyLAN; and, obviously, ATM. With all the hype surrounding ATM, compounded by IBM's unrestrained endorsement of it, ATM will be, for many users, the goal post around which they have to formulate their bandwidth-to-the-desktop strategy.

The issue here is that, despite the availability of the adapters, ATM to the desktop is not going to be a reality within IBM-biased commercial enterprises until at least 1996. This customer base is still evaluating the optimum, mission-critical LAN/WAN internetworking solutions for integrating their Systems Network Architecture LAN and link traffic with non-SNA LAN traffic. Many users have been working on this diligently for more than two years. ATM adds another, somewhat complex variable to this process.

Moreover, ATM standards for multimedia, ATM WAN tariffs and even IBM's own Nways family of ATM products are still evolving. When it comes to ATM, 1995 will be a year for planning as opposed to implementation. On top of all of this, haste — understandably — is not a characteristic of the mission-critical world.

So users are going to require alternative solutions to span the gap up to — and some cases, even beyond — the advent of wide-scale ATM usage. These solutions are going to fall into two distinct categories: one set of cost-effective solutions for those users installing new LANs, and another set, explicitly geared for leverag-

ing the existing investment, for those users that already have a large population of token-ring devices.

Installation of LANs at remote offices continues at an explosive pace. It is not unusual for these remote office projects to involve thousands, or even tens of thousands, of PCs and workstations. With such volumes, a solution that is even \$100 per station cheaper will result in huge — and impossible to resist — cost savings.

Ethernet is becoming the obvious choice for this type of scenario involving large numbers of new stations, given that Ethernet adapters for PCs and work-

> stations can be as much as \$200 cheaper than equivalent token-ring adapters. Some hitherto true-blue customers have already started to pursue this cost-compelling solution.

> IBM now supports Ethernet, and even SNA over Ethernet/802.3, on nearly all of its strategic platforms, including the 3174 and 3172. The 3745 Communications Controller, IBM's flagship mainframe gateway, is the notable and crucial exception. Although the 3745 has had an Ethernet/802.3 adapter

since September 1992, IBM still permits only TCP/IP to be used with this adapter.

Fortunately, this is not as big an impediment as most people had feared. One easy solution is to use an inexpensive (under \$20,000) SNA LAN gateway, such as the 3172, that supports SNA over Ethernet. Another option being considered by many is to route SNA traffic, after encapsulating it within TCP/IP, between the Ethernets and 37xx gateway attached to a token-ring net. Routing, like translation bridging as performed by IBM's 8209, will provide transparent interoperability between Ethernet and token-ring nets.

Switching token-ring nets will enable existing users to gain access to more bandwidth without the need to replace or upgrade their existing LAN adapters or wiring. Users will, however, have to invest in new, port-to-port switching intelligent hubs. With switching token rings, each user will get dedicated bandwidth. Twice the bandwidth (up to 32M bit/sec) could be provided for LAN servers by replacing the adapters on the servers only with full-duplex adapters. With full-duplex token rings, the server could be transmitting data to one PC at full-bandwidth (16M bit/sec) while receiving data from another PC, also at full bandwidth.

Between Ethernet and its enhancements and the new token-ring enhancements, there are now cost-effective solutions to tide over both new and existing users for the next few years. Pursuing any of these solutions is not going to lock you out of ATM — quite the contrary: ATM-capable hubs and many ATM switches, including IBM's Nways Model 200, will support LAN ports and LAN speeds up to 100M bit/sec.

So the current crop of alternative LAN solutions should not be viewed as mutually exclusive with ATM. Instead, think of them as an access ramp to ATM.

→ Guruge is an independent consultant specializing in internetworking and IBM network architectures. He can be reached at (603) 878-1303 or via Internet/MCI Mail at aguruge@mcimail.com.

#### **Opinions**

BY ANTHONY RUTKOWSKI

At the fifth meeting of the Internet Society (ISOC) board of trustees in Prague in early June, a resolution was adopted requesting the Internet Architecture Board (IAB) and the ISOC Advisory Council to prepare a draft code of conduct for the board of trustees at its next meeting. One question that inevitably arises is,

what authority does ISOC have in this matter? The answer goes to some of the fundamentals of the Internet, how it operates and how it is governed.

The Internet doesn't just happen. Like any other electronic communications network, the Internet operates because of an enormous amount of cooperation and coordination among countless parties around the world. This includes everyone from the bodies that develop the standards and architectures, to the secretariats and Network Information Center that support naming and addressing, to the providers of network services, to manufacturers of hardware and software, to end users who purchase those services and attach their computers and networks to be part of the Internet.

ISOC was created as an international organization to play a leading role in facilitating this coordination and cooperation. Its trustees, officers and members represent a large cross section of this community, including a number of the individuals who conceived and scaled the Internet and its technologies.

In codes of conduct, as in many other areas, ISOC's authority derives not from law or self-anointment, but from the willingness of most of the Internet community to work in common through such an organization and abide by its published norms, whether they be standards, evolutionary paths or user codes of conduct.

There are compelling reasons for net providers and users to cooperate through a common mechanism. This is particularly important for the Internet, which consists of more than 35,000 private nets connected in a massive collaborative global mesh.

The foremost reason is that networks simply cannot function without some minimal level of coopera-

tion among all the entities that are part of the network. Conversely, certain kinds of conduct can harm the network and others attached to it. Even at the outset of the new era of the electric telegraph nearly 150 years ago, similar concerns motivated cooperation among operators through international unions.

The process is always the same: A consensus is reached on a few norms, which are articulated and announced — then enforced by the network service providers for the common good.

The notion that you need some kind of governmental body to develop, promulgate and enforce norms of conduct plainly flies in the face of a society where services generally, and information networks in particular, are overwhelmingly the province of the private sector with minimal government involvement. Even among regulated common carriers, operational norms and standards are developed through common private-sector bodies and enforced among the carriers, not by government.

Using autodialers on telecommunications networks for mass advertising is hardly a new phenomenon. However, it remains an invasion of other users expectations of privacy and can harm net performance. In some instances, such activity may also cause users — particularly outside the U.S. — to incur significant additional connectivity costs and reduce their ability to receive wanted traffic. The ease with which massive, abusive autodialing can be done

on the Internet gives rise to a compelling need to control it.

Among users, there is a widespread expectation that ISOC, on behalf of the Internet community worldwide, should properly address the matter of Internet autodialing and develop provisions that place users on notice regarding what is unacceptable conduct, and allow effective enforcement by service providers. As the international facilitator of the Internet, ISOC is the only organization that could effectively fulfill this important need.

Rutkowski is executive director of the Internet Society in Reston, Va. He can be reached at (703) 648-9888 or via the Internet at amr@isoc.org.

Does the Internet Society have the authority to set a code of conduct for the Internet?



BY MARTHA SIEGEL

We've been hearing a lot about censors, stalkers, flamers, defamers, forgers and antiadvertising guerrillas on the Internet. Clearly, the era of the small, homogeneous cooperative is over. At the request of no one, the Internet Society (ISOC) a private organization previously concerned

mainly with the medium's technological functions, has now decided to attempt behavior modification on what it views as the unwelcome hordes

of new Internet participants. An unsolicited code-of-conduct statement for network operators and users is coming from ISOC, ready or not.

Plain and simple, ISOC has no authority to tell anyone else what to do. No one sold the Internet to ISOC. No one appointed or voted ISOC the final authority over the Internet. The 15 million to 30 million diverse Internet users didn't ask the relatively tiny 3,700-member ISOC for moral guidance. There is precedent for standards of cooperation that keep phones, air traffic and other international facilities running smoothly. At-

tempting to control the behavior of those who use such facilities is not only unprecedented but appalling.

Apparently, a primary stimulant of ISOC's wish to set standards for Internet conduct is its displeasure with my firm's commercial mass posting to Usenet. One wonders what sort of mentality is shaken to the core by an ad, but finds profanity, pornography, electronic vandalism and censorship only mildly offensive or even, in the name of a pet cause, justifiable.

The dubious wisdom of ISOC's control initiative invites examination of motive. With regulatory power over the Internet comes the potential for influence and wealth. Manipulation of standards for commercial Internet activity could benefit some and harm others. Are we to believe these facts have escaped ISOC's notice? Just what are ISOC's interests? Is ISOC concerned with wiping out mailbombers and cancelbots or just advertisers?

What we already know is that ISOC's desire to regulate certain conduct has little to do with achieving orderly operation of the Internet. Volume capacity has been cited as a problem, but the fact is, bandwidth can't tell the difference between advertisements and extra traffic from the 10,000person daily increase in Internet users. No matter, ISOC President Vinton Cerf doesn't think increased usage is a problem. "The Internet," said Cerf in a July 24 Arizona Republic interview, "is able to leap quite far ahead to keep up with demand..." Given that, what will standards of conduct

accomplish other than limiting free speech?

What's more, judging from past actions, there is the danger that ISOC will escalate from espousing standards to enforcing them. Consider this: ISOC literature states that, with respect to Internet commercial use, the only real restrictions "are those expressed by the market." In my firm's experience, with more than 20,000 positive replies to our advertisement, electronic vandals notwithstanding, the market treated us well. Nonetheless, various access providers, at ISOC members' active inducement, insisted we stop. The market had nothing to do with it. No one likes dictators or censors. ISOC is shaping up to be both.

There are presently bona fide laws passed by legitimate authorities that could and should be applied to Internet users' activities. ISOC should retain the key role of keeping the Internet operational and easily accessible to all. But any unauthorized body attempting to control public conduct has gone too far. ISOC advocate Ed Krol says in his book, The Whole Internet Users Guide and Catalog, that the Internet is like a church, and a network refusing to follow ISOC's rules "could be excommunicated until it mends its evil ways." Scary. In this "church" censorship is becoming a sacrament and there is no doubt about who wants to play God.

• Siegel is CEO of Cybersell, Inc. and an attorney with Canter and Siegel, both in Scottsdale, Ariz. She can be reached at (602) 661-3911 or via the Internet at msiegel@cybersell.pericles.com.

#### NETWORK WORLD

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Linda Musthaler, Josh Penrod, Joseph Skorupa Currid & Co.; Mark Miller, DigiNet Corp.; Mark Gibbs, Gibbs & Co.; James Kobielus, Dyn Network Management, Inc.; Michael Goulde, David Marshak, Ronnie Marshak, John Rymer, Seybold Group; John Morency, Strategic Networks Consulting, Inc.; Daniel Briere, Chris Finn, Mark Langner, TeieChoice, Inc.; Marc Robins, Robins Press, Inc.

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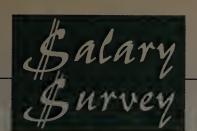
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Washington, D.C. Bureau

National Place 1331 Pennsylvania Ave. NW, Suite 505 Washington, D.C. 20004

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## Feature

# Compensation rules are a changin'

Net execs plan healthy salary hikes next year but increasingly are linking gains to bonuses for individual or team performance.

By JERRY LAZAR

#### Salary situation

Respondents were asked to indicate the average annual salary, average percentage increase, new-hire replacement cost, average number of years on the job and the level of education required for each of the

networking or communications-related positions listed below.									
	age annua	New-hire replace cost							
Position	1994	1993	Percentage increase	Projected increase 1995	1994	1993	Percentage increase		
Management									
Upper	\$105,963	\$83,910	26.3%	5.6%	\$100,649	\$72,251	39.3%		
Middle	\$67,827	\$59,427	14.1%	4.7%	\$62,952	\$52,696	19.5%		
LAN									
Senior	\$56,914	\$52,590	8.2%	4.8%	\$54,371	\$47,314	14.9%		
Middle	\$44,750	\$42,455	5.4%	4.4%	\$42,801	\$38,352	11.6%		
Entry	\$32,181	\$30,536	5.4%	4.4%	\$31,498	\$28,454	10.7%		
Engine	Engineering								
Senior	\$66,737	\$59,477	12.2%	4.9%	\$64,494	\$53,273	21.1%		
Middle	\$52,296	\$47,468	10.2%	4.6%	\$49,985	\$42,519	17.6%		
Entry	\$35,951	\$33,478	7.4%	4.6%	\$35,032	\$31,714	10.5%		
Operati	Operations								
Senior	\$53,124	\$48,869	8.7%	4.5%	\$49,151	\$43,786	12.3%		
Middle	\$40,015	\$37,457	6.8%	4.3%	\$37,134	\$33,616	10.5%		
Entry	\$27,524	\$26,653	3.3%	4.2%	\$26,472	\$24,868	6.5%		
Networ	Network application development								
Senior	\$60,938	\$53,701	13.5%	4.8%	\$57,695	\$47,314	21.9%		
Middle	\$47,645	\$42,509	12.1%	4.5%	\$44,620	\$38,352	16.3%		
Entry	\$34,252	\$31,057	10.3%	4.4%	\$33,129	\$29,270	13.2%		

or network executives who hold the purse strings, the compensation outlook for next year is promising, with salary increases averaging between 4.2% and 5.6%, according to a recent reader survey.

But more importantly, Network World's 1994 Annual Salary Survey finds that there are some new precepts that may rewrite the rules managers use to compensate individuals in the LAN, engineering, operations and network application development sectors.

While salary levels are poised to rise next year, the compensation mix is changing. Bonuses are becoming a larger percentage of overall compensation, as salaries increasingly are being pared in favor of bonuses that reflect individual or team performance. Thus, your company's competitiveness and hence its ability to provide performance bonuses — may prove a lure to prospective employees, as well as those already in the fold. More importantly, it changes the outlook on salary hikes, giving managers better performance metrics on which to tie salary increases.

Fewer employees are job-hopping today than ever before, deciding to shift horizontally within organi-

Continued on page 70

#### Continued from page 69

zations rather than risk venturing into the unpredictable job market. And those that are hopping around internally are generally seeking more responsibility or new skills; higher compensation ranks lower on the list.

This year's survey also finds that network application development personnel are closing the salary gap with engineers, signaling the strategic role net developers now play in their company's objectives to use networking technology to quickly respond to changing market conditions. Net managers looking to beef up their development staffs should expect to budget more for developers' salaries in 1995 than in previous years.

There is ample evidence that net application developers' salaries are on the upswing. Between 1993 and 1994, net developers' salaries as a group grew more than any other network unit outside of top management. And that trend will continue into 1995, as salaries in that sector are expected to rise between 4.4%

Application developers' salaries may be on the rise, but the largest salary increases for 1995 appear to be reserved for upper level network managers - the chief information officers, directors and vice presidents — who have shouldered extra burdens as companies have either downsized staffs while adding services, or managed outsourcing of network operations. Survey participants projected salary increases of about 5.6% for upper level net managers and 4.7% for middle-level net management positions. And in some industries, top-level net executives are earmarked for salary increases of almost 9.5%.

According to this year's survey of more than 600 network managers, salaries took a major leap forward in 1994. Upper management

received an average salary increase of more than 26%, middle management received more than a 14% average increase, and senior network application development specialists received average raises of 13.5%. Everyone with the possible exception of entry-level operations personnel who averaged a 3.3% increase - more than kept up with last year's moderate rate of inflation.

'It's a little bit of a comeback play for salaries," says Mark Silbert, director of communications for Robert Half International, a Menlo Park, Calif., personnel service that specializes in technology personnel. "Salaries were stag-

Nine out of

respondents

were men.

every 10

nant for a while, and now they are catching up."

"Look at all the layoffs over the last couple of years," adds a net manager who asked not to be identified. "We are doing more work with less people. We have to compensate them to keep them happy.''

Another reason why salaries may have gone up is that

the cost of hiring replacements has increased, as well; new-hire costs have increased even faster than salaries for existing personnel. In general, new hires are paid only a couple of thousand dollars less than the people they are replacing.

"There are fewer people out there qualified to jump in with both feet and take control," explains Rick Lehner, project leader for Communications and Rail Car Systems for Texas-

#### **Title breakdown by salary category**

#### **Management**

**Upper:** CIO, VP, director

Middie: Network manager, data communications manager, technical support manager

#### LAN

Senior: LAN manager, product manager

Middle: LAN administrator, senior analyst, consultant

Entry: Operator, analyst



#### Engineering

**Senior:** Network architect, engineering manager, consultant Middle: Lead designer, senior engineer, senior analyst

Entry: Designer, engineer, junior analyst



#### **Operations**

Senlor: Data center manager, training manager, technical support manager

Middle: Training specialist, technical support engineer

Entry: Network operator, help desk operator, technical support

specialist, net management specialist

#### **Network application development**

**Senior:** Development manager, programming manager, project manager

Middle: Lead programmer, senior systems analyst, database

administrator

Entry: Client/server programmer, systems analyst

#### Bonuses shake up pay mix

In today's business environment, performance is the name of the game. That's also true in today's networking environment: Bonuses, typically based on performance, are becoming an ever-iarger percentage of an empioyee's overail compensation.

1994 salary breakdown Bonuses 5% Base salary 93% Overtime pay 1% Stock/stock options 1% In 1993, base salary accounted for 96% and bonuses just 2% of total compensation.

That's good for a manager whose company is doing well because they can promise larger bonuses at the end of the year. But those managers working for a company that may be struggling could find themselves promising bonuses that never materiailze.

According to Network World's 1994 Salary Survey, the compensation mix for salarles has shifted somewhat within the last year, as employers place more emphasis on performance bonuses as a larger factor in determining employee salaries (see graphic).

The cause is probably the continu-

ing drive to rightsize companies in the U.S. Firms are trying to get lean and mean, and one way of doing so is to reduce fixed expenses. Bonuses are by definition "if and when" the company has the money to spare.

In many cases, performance does not refer solely to the job the employee is doing, but rather on how well the iarger group is doing. "The bonuses are optionai," says Robin Lucy, director of information services for Vermont

Country Store, Inc. "But company performance determines bonuses."

In other words, a hotshot local net specialist in a struggling company could draw nothing but base salary, while a duffer in a firm that's dolng weii could pull as much as a month's salary come December. And that's something managers may have a hard time expialning.

gulf, Inc. in Raleigh, N.C. "Overall expertise is becoming so vertical, you will not find [someone to fill] a position. If someone is an expert at AT&T setups, if they go over to a Northern Telecom [system], they are going to be pretty much blind at first.'

As noted, upper and middle management received the biggest salary boosts over the last year. Upper management's average salary broke the \$100,000 mark, reaching \$105,963 this year, compared to \$83,910 last year. Middle management received an average annual salary of \$67,827, compared to \$59,427 in 1993. For 1995, respondents projected that upper net managers will receive a 5.6% salary hike on average. On an industry-by-industry basis, wholesale/retail businesses expect the biggest increases (9.4%) for top net managers, while government and educational sectors plan 3.9% hikes. Middle-level managers are projected for a 4.7% salary hike. But industries such as manufacturing, financial/insurance, health care and wholesale/retail could pay almost a percentage point higher.

"The higher positions have more financial and project responsibility," explains one network manager at a large manufacturing facility. "They are assuming the risk, so they get the compensation."

"If you yell at them when things are bad, you have to be nice to them when things are good. Generally, vituperation starts at the top," observes Robert Half's Silbert.

#### **WEIGHT IN GOLD**

Network application development personnel received double-digit salary growth in senior-, middle- and entry-level positions this year, according to the survey. Senior-level developers received an average salary of \$60,938 - up 13.5% from last year; middlelevel developers averaged 12.1% raises, with an average salary of \$47,645; and entry-level network application development personnel received average salaries of \$34,252, an increase of 10.2% over last year.

These increases are slowly beginning to correct an imbalance between developers and engineering staff, but engineers are still being paid approximately 10% more than their application development counterparts. For next year, survey participants have earmarked 4.8% salary raises for senior-level net application specialists, 4.5% for middle-level developers and 4.4% for entry-level jobs. Again, manufacturing, health care and wholesale/retail are a bit more aggressive and could offer anywhere up to three-quarters of a percentage point

#### Survey respondents' job functions Network management Engineering 47% Network application Operations

"Programmers have always been pushed down to the grunt level from the point of view of IS," observes Dugal Easton, administrator of utilities and telecommunications for Seattle public schools. "Which is odd, because they really are the core of IS."

"We are now in a state where we are trying to deliver more and more capability to our end users," says Donald West, manager of telecommunications and office automation at Shearman & Sterling in New York. "And those peo-

#### Mgrs. must battle salary perceptions

No matter how well an employee may be compensated, it probably Isn't enough for that individual. Human nature being what it is, most people believe they are being shortchanged by their company, even though, according to our numbers, at least some of them are mistaken. Nevertheless, network managers are going to have to be aware of those beliefs when it comes time to talk salary.

According to our survey, twothirds of survey respondents think their compensation is in line with other managers at their level in their company. Of the other onethird, nearly all — 90% — think it is lower than other managers at their

"It's just a human folble," says a network manager at a large manufacturing company. "If you have a good organization where salaries are not well known, people play guessing games.'

The manager adds that he was personally convinced that he was not being as well compensated as other people in technical, englneering and administrative posi-

When asked how they think their total compensation compares with

"I know I can walk down the block to another firm and make \$20,000 a year more than I do here," according to a manager who asked not to be identified.

others similar positlons the Indus-48% try, think it is about the same, 37% think it is worse and 15% think it is better.

In fact, anecdotal dence

that people are even more pessimistle than the survey indicated.

No one who was Intervlewed thought they were doing better than average within the industry, and 60% were convinced they were doing worse.

block to another firm and make \$20,000 a year more than I do here," according to another manager, who asked not to be identified.

"It's that rumor mill," says Mark Silbert, director of communications at Robert Half International. "Everybody knows what everybody is making, but everybody is wrong."

ple who are able to really program and deliver sophisticated applications are very desirable employees and can command dollars commensurate with their desirability."

Lehner agrees. "Those who can generate successful network applications are worth their weight in gold," he says.

Engineers remained the most highly compensated nonmanagement personnel. Senior engineering personnel received an average increase of 12.2% and an average salary of \$66,737 in 1994; middle-level engineers got a 10.2% increase to \$52,296; and entry-level

engineers received an average raise of 7.4 %, bringing their salaries to \$35,951 on average.

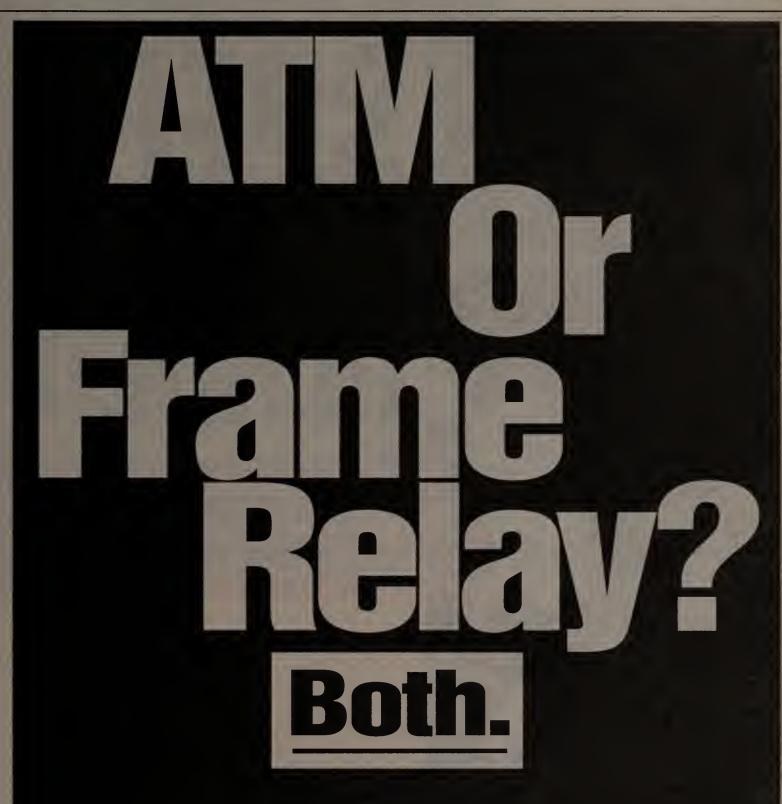
For 1995, the survey finds companies plan to hike engineers' salaries between 4.6% and 4.9%, with senior-level personnel commanding the higher increase. Here, too, health care and wholesale/retail appear poised to offer the largest increases — between 6.5% and 7.2%.

#### THE LAN WORLD

Compared to the double-digit growth of other positions in the application development and other sectors, LAN workers received relatively modest increases over the last year albeit healthy gains when compared to cost-ofliving adjustments. Senior LAN personnel got an average salary increase of 8.2% this year and average salaries of \$56,914; the average salaries of middle- and entry-level LAN personnel each went up 5.4% - to \$44,750 and \$32,181 on average, respectively.

For next year, the survey shows personnel in LAN positions posting salary hikes between 4.4% and 4.8%. Industries like the financial/insurance, manufacturing, health care

Continued on page 72



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#### Continued from page 71

and wholesale/retail reserve 5% to 6% gains for senior LAN managers.

The area of network operations is perhaps the only area where entry-level positions are routinely filled by individuals without college degrees. Even that is changing, according to industry observers, especially on the West Coast where there is an increasing perception of operations as a job with a clear career track. Senior operations staff salary increased 8.7% to \$53,124 on average. Middle-level operations personnel received on average a 6.8% raise, as

average salaries rose to \$40,015. Entry-level salaries rose only 3.3%, as average salaries reached \$27,524.

#### THE DEEP FREEZE

Mind you, that is not to say that anyone will admit on the record to having gotten the kind of salary increases reported in the survey.

"We have been on a salary freeze in this state for the last three and a half years," says Easton. "It's only very recently that we went through a reorganization and salary study."

"We're a privately held mail order retail

company," says Robin Lucy, director of Information Services for Vermont Country Store, Inc. "And we've held the status quo."

"Our industry is just coming out of a tremendous recessionary period, and we are trying to become profitable," says Michael Kaminski, manager, advanced development for Manufacturing Information Systems at General Motors. "We are probably meeting inflation, but I don't think we are doing much more than that."

With government, retail and automotive salaries seemingly staying relatively stable,

#### **Experience counts**

Respondents have on average...

...been in their current position for 4 years.

...been working for their current employer for 9 years.

...15 years of industry experience.

where are the double-digit raises coming from? NW's survey results show that the whole-sale/retail industry is the most aggressive in terms of increasing compensation levels for 1995. In almost every category, respondents from the wholesale/retail industry plan increases of at least a half percentage point more than their counterparts in other industries. Survey results also show that there is above-average salary growth in the manufacturing, financial/insurance industries and health care sectors.

Looking at salary levels across geographic regions didn't yield any major surprises. The middle Atlantic and New England states lead the way in terms of highest pay for positions and planned salary increases. Respondents based in the southeastern and southwestern portions of the U.S. expect salary increases in 1995 to be a full point or more less than respondents based elsewhere.

Network managers based in New England indicate that they pay senior LAN staffers an average of 67,094, with a projected increase of 5.6% for 1995. That means if you plan to lure talent away from companies in New England or even the middle Atlantic states, you should expect to pay higher salaries, or kick in

Two-thirds of respondents believe their compensation is in line with other managers' at their level in the company.



other enticements to cinch the deal.

The same holds true for engineers and operations staff, both of whom command greater pay in the middle Atlantic and New England states than elsewhere in the country.

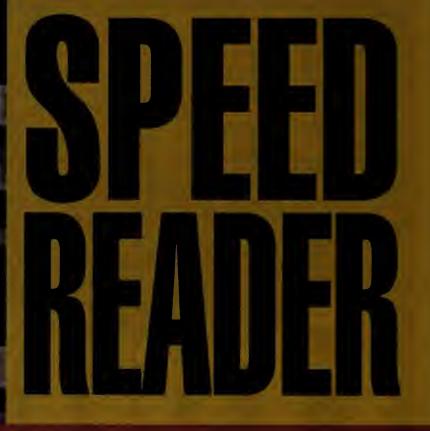
#### **TEPID TURNOVER**

Network managers did not have to worry too much about turnover in the early 1990s. Jobs were tight, and people were more than willing to trade mobility for job security. Only 6% of survey respondents changed jobs between 1992 and 1993, for example. Historically, technology personnel turnover rates have been in the high teens or even 20% a year, according to Edward Perlin, president of Edward Perlin Associates, a New York management and compensation consulting firm.

There is some indication that people are beginning to polish off their resumes, however. According to our survey, 10% of all personnel changed jobs over the last 12 months.

"I'm surprised the number is that high," says a network manager for a major manufacturer. "There has been a tremendous matura-

Continued on page 74



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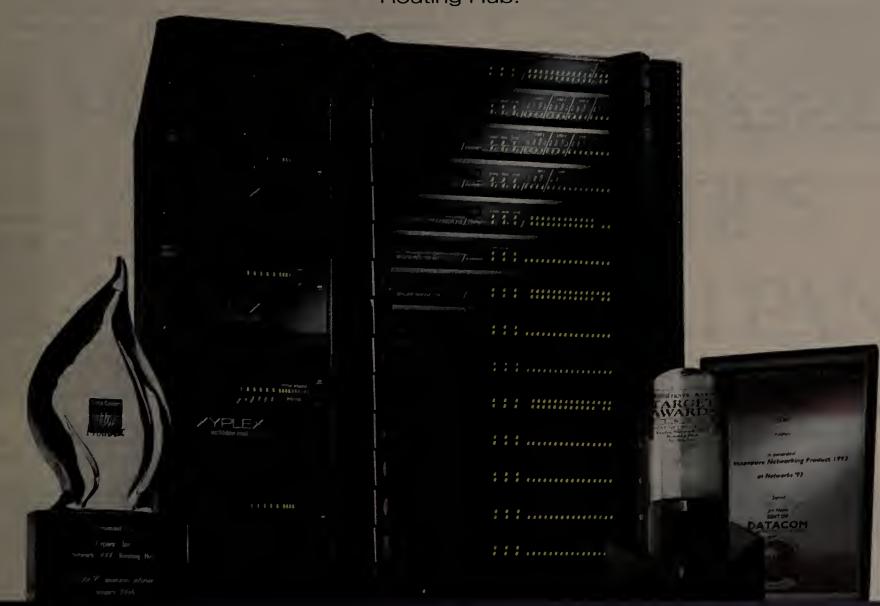
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The awards

just keep on

COMMWEEK

#### Continued from page 72

tion in the industry... I am surprised the turnover isn't even lower."

Perlin, on the other hand, thinks more people will be looking to move. "I don't think you have a big increase in turnover yet," he says. "But expectations are starting to get a little higher, and we are getting more nervous phone calls from people." Perlin's company conducts exhaustive salary surveys for Fortune 500 firms, which includes in-depth interviews with individuals from IS and other business

But, perhaps because personnel are staying within the company, job movement within an organization is relatively high. About 20% of the personnel surveyed changed jobs within

"We have seen a lot of restlessness," says Lehner. "Given that it is harder to fit into other places, people are having to bite the bullet and stay where they are....But that amount of movement should tell management that you can't assume people are happy just because they haven't left the company."

Interestingly, when people do change jobs,

our survey indicates that it is generally not because they want more money. According to the findings, reasons given most frequently were to gain additional responsibilities (39%) and to learn new skills (26%). By contrast, 24% of users cited compensation as a reason for changing jobs.

That doesn't surprise Perlin. "When I talk to my clients, when I give lectures, I tell people that the No. 1 thing to retain your staff is not pay," he says. "Technical people need a technical environment that they are learning with and are happy with. Then they need a defined

career path — and then they want the compensation.'

"It really depends on what your goals are," says one manager who asked not to be identified. "I work to live, I don't live to work. And if the money is fine, I am not going to go any-

where. On the other hand, I had one job where the ladder had a big steel plate over my head. So I left."

But not everyone agrees. "They are all lying," says West flatly. "In my experience, either they are after more money or they are really annoyed with management."

Another manobserves: "Sure, they want more responsibility, but if they don't get more money, too, they are not going to take the job."

situation for us."

believe their salaries are comparable to the industry

average.

questioned...

Of the repondents

believe they lag the industry average.

believe their salaries are better than the industry

average.

Overall, most predict continued growth in the importance of networking to the overall corporate structure and a commensurate increase in employee salaries. "Technology i becoming integral to the day-to-day operations of all companies," West says. "Firms are seeing the payback for their investment in technology. Now it is our time to make the companies better. If we succeed, it is a winning

- Lazar is a free-lance writer based in Cliffside Park N.J., who perennially complains he is underpaid

### How the survey

was conducted

Network World's Fifth Annual Salary Survey Is based on 643 responses from a randomly selected sample of the publication's subscribers who manage their companies' networks.

To ensure that the sampling accurately reflected the U.S. networking population, company sites were chosen from a breadth of industries. Only subscribers who specify, recommend or approve purchases of \$1 million or more annually in net equipment and services were invited to participate.

The survey requested the network manager to provide salary and related information for himself or herself, plus the various titles that report to the manager. Information was collected using a fourpage questionnaire, which was mailed last May 5.

Under the direction of NW Research Director Anne MacKay, answers from the returned questionnaires were complied into a database. The data was then averaged and cross-tabulated by vertical Industry and geographic region.

Version 3.1

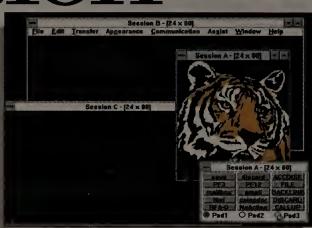


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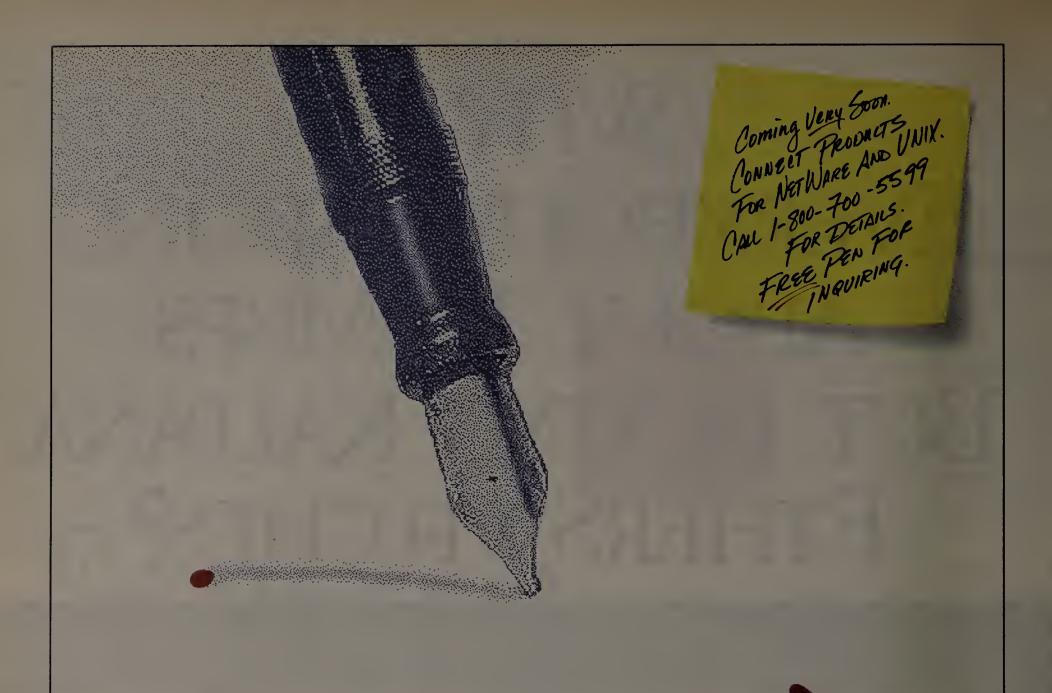
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# Routers: By MARK poised to make

# the transition

With ATM support, better performance and branch office products, routers remain a viable option for enterprise nets.

handle ever-heavier traffic loads and bandwidth-hungry applications or build high-speed internets for the first time may be foolhardy to leave routers out of the equation. Asynchronous Transfer Mode switches and ATM-ready hubs that support greater capacity than many routers may be grabbing the headlines of late, but router vendors are doing everything they can to keep up. For instance, router vendors are embracing ATM and continuing to improve performance by adopting such technical advances as multiprocessing architec-

sers mulling over how to rebuild their

enterprise network infrastructures to

At the high end of the market, router vendors are polishing off architectures that integrate ATM as well as LAN switching, LAN bridging, support for IBM Systems Network Architecture traffic and fault-tolerant performance into their products. At the other end of the spectrum, router vendors are addressing the increasing need to tightly tie low-volume branch offices into the enterprise with fixed-configuration, low-cost devices.

These router advancements are unfolding just as analysts are starting to predict that the worlds of routers, hubs and ATM switches are headed on a convergence course. The recent merger of prominent router vendor Wellfleet Communications, Inc. and leading hub maker SynOptics Communications, Inc. indicates that the industry may be on the cusp of this con-

All of these developments contribute to an agonizing decision for users attempting to install their initial internetwork or trying to upgrade router-based internetworks for higher capacity. But there is some ruleof-thumb guidance. Network managers need to predict when and if they'll need ATM, then plan accordingly.

As LAN-based ATM slowly migrates through the corporation, the router will play an instrumental role in merging existing networks with ATM nets," says John DePietro, internetworking analyst at International Data Corp. (IDC) in Framingham, Mass.

DePietro boils down the implementation timetable to a tactical vs. strategic decision. "If you need to make a tactical decision today — for example, to support a CAD application for an engineering workgroup - then you must go with vendors that have ATM products available today," he says. "The mass market, however, is on a strategic track, looking at the next two years. In this case, the network manager must focus on

developing a migration strategy that preserves the greatest amount of the internetwork infrastructure."

And router vendors are feverishly at work to improve their products with what's

needed to retain existing customers and position themselves as preeminent suppliers in future ATM envi-

"Networks are like breathing entities - continually expanding and contracting," says Ross Kocen, marketing manager of internetworking products at Retix. For these dynamic networks, the scalability of the router, along with the flexibility to add additional numbers and types of LAN or WAN interfaces, becomes a central issue in choosing a router.

Router vendors are meeting the challenge with a new genre of highspeed interface boards, including ones that support ATM LAN links and some connecting to ATM WAN services. Other new interfaces support Switched Multimegabit Data Service WAN links, as well as 100M bit/sec tast Ethernet and Fiber Distributed Data Interface over twisted-pair LANs. While today's routers may not be physically larger than last year's models to accommodate these new boards, their processing power has increased dramatically to support the high-speed interfaces.

Buyers also have to keep an eye out for what is happening with the software side of routers. Support for routing protocols such as the Routing Information Protocol (RIP) and Open

Shortest Path First (OSPF), as well as major network transport protocols such as the TCP/IP suite, Novell, Inc.'s IPX and SNA, remains important. But optimiz-

ing the transmission of these protocols over the WAN is becoming a more significant issue, especially at branch offices. Performance issues, such as verified throughput results, high reliability and manageability, are also high on the network manager's shopping list.

Switching, bridging or routing: Which is right for you?

Page 80.

Page 84.

Users view

throughput and remote office support as

keys in router selection. Page 94.

Buyer's Guide chart guides you to the right route in the buying process.

## ETWORK VORLD

Routers

- Cisco Systems, Inc. Cisco router family
- CrossComm Corp. XL family
- ✓ Proteon, Inc. CNX and DNX families
- 3Com Corp. NetBuilder family
- Wellfleet Communications, Inc. Node router

family

Complete details about The Short List appear on page 94.

#### **SURVEYING THE MARKET**

High-end routers that form the backbones of enterprise internetworks include options for every conceivable LAN and WAN interface, as well as support for all the popular and even some obscure routing and network transport protocols. Highend routers support upward of 50 LAN or WAN ports.

Mid-range devices are used to feed backbone machines in large enterprises. These mid-range units can also be tapped to form backbone internetworks for smaller enterprises. Two or three LAN ports plus four to eight WAN ports is a common configuration, as is support for common routing and network transport

Rounding out the market are branch office routers that connect low-volume sites into the enterprise. With a typical configuration of one LAN port supporting Ethernet or token ring only and two WAN ports Continued on page 78

#### Continued from page 77

supporting low-speed leased lines or possibly dial-up connections, branch office routers are selling quickly as net managers extend the reach of their internetworks.

Global competition is fueling the growth in branch office connectivity, says Michael Howard, president of Infonetics Research, Inc. in San Jose, Calif. "The strategic purpose of the remote office is to locate sales or service support functions closer to the customer," Howard says. "That vital customer link, which is strongly tied to corporate revenues, is more fully supported when all employees have access to corporate data at anytime.

The architectures of backbone and branch routers differ because their functional and operational requirements are very distinct. Backbone routers are expandable and must be configured by operations personnel. Also, they must be optimized to handle a large amount of traffic. As a result, they contain many highly specialized components such as individual interface and switching processors, as well as route optimization software. Backbone routers also are often built to support a wide mix of LAN and WAN protocols — everything from Arcnet to X.25.

The branch office router is a different story. These units are often fixed-port, preconfigured devices with a single processor that controls the operation of three to four interfaces. While the protocols supported may be similar to backbone routers, the software on branch office routers must be optimized for ease of installation and operation because most branch sites do not have extensive networking expertise in-house. Instead, branch locations depend on headquarters staff for support, and headquarters, in turn, requires that any router placed at the branch office be as self-sufficient as possible.

#### THE ATM STAMPEDE

According to Rick Tinsley, director of product marketing at Newbridge Networks, Inc., "The traditional backbone router includes three key components: network cards, which are protocol-specific and interface to LANs and WANs; a control processor, which provides route calculations and topology updates that are done relatively infrequently; and a backplane, or switching fabric, that must operate at least at the speed of the network wire and provide the electrical path for the data."

When a packet comes into an interface, the destination address is examined and a control processor is consulted to determine the appropriate outgoing path. That packet is then sent from the receiving interface across the backplane to another interface, providing a link to the target LAN segment or WAN port. Physical limitations to optimum packet throughput can exist in this environment, such as an insufficient number of ports on an interface, a central processor with insufficient power or a slow backplane bus.

A handful of leading vendors are fitting routers into their overall ATM strategy to remove these potential bottlenecks.

Newbridge, for example, uses its Video, Voice, Image and Data (VIVID) architecture to tie routers into an ATM backbone. VIVID calls for the use of three distinct products that includes VIVID Route Server software running on a Unix-based system.

The base unit in the VIVID architecture is the VIVID Ridge, which is designed to convert connectionless Ethernet or token-ring packets to connection-oriented ATM cells. The VIVID Route Server is then consulted to determine the optimum route for both LAN-to-LAN and LAN-to-ATM network traffic.

Finally, the VIVID Workgroup Switch, a 12-port matrix switch, provides the ATM back-

bone over which ATM traffic is passed. Taken together, these three elements provide both routing and switching.

"The advantage of an ATM-based architecture is its scalability," Tinsley says. "You can add interface, processing and switching power where you need it, rather than having to

purchase a larger box that possibly contains elements that you do not need. In addition, critical components, such as the Route Server, may be redundantly duplicated, thus increasing the fault tolerance of the network."

Cisco Systems, Inc.'s Cisco Fusion architecture is similar to VIVID. CiscoFusion consists of three primary components: an interface processor that connects to the LAN or WAN; a routing processor that employs RIP, OSPF, the AppleTalk specific Routing Table Maintenance Protocol or other routing protocol; and a switching processor that is dedicated to switching and forwarding packets at a feverish pace typically an aggregate of at least 250K

As part of the CiscoFusion architecture, the Cisco 7000 router acts as the interface and routing processor and is, in turn, linked to an ATM switch that can reside in the same or separate chassis. Cisco's recently announced Hyper-Switch, codeveloped with NEC Corp., pro-

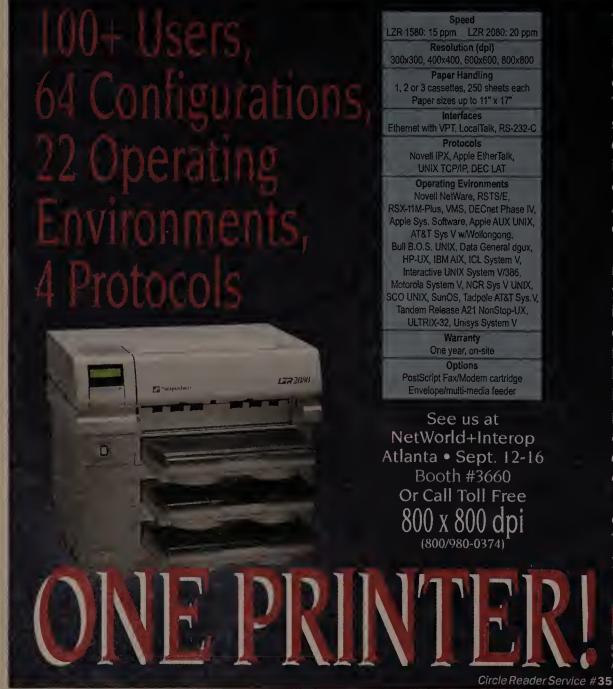
vides the ATM switching part of the CiscoFusion architecture.

When considering migration paths to ATM, the No. 1 concern of the end user should be protecting the appli cation — assuring tha the AppleTalk-, Net-Ware- or TCP/IP-based application that operated in a routed envi ronment will continue

to operate in a switched ATM environment, says Larry Lang, Cisco's senior product-line manager.

Lang envisions the first integration of ATM within routed environments to be replacements for high-speed backbones such as FDDI, which would be transparent to users and their applications. The second step, with ATM-attached workstations, would come later, after some of the issues surrounding LAN

Continued on page 80



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ATM backplane support

Of the 48 vendors listed in the Buyer's

Guide chart starting on page 84, these

four claim to support an ATM

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Cray Communications, Inc.

Newbridge Networks, Inc.

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TANDEM MEANS BUSINESS

#### Continued from page 78

support, such as standards for protocol encapsulation and the management of broadcast packets, are ironed out in the standards committees.

#### **MORE MULTIPROCESSING**

While Newbridge and Cisco are using multiple processors to integrate routing and ATM switching, Wellfleet is generally credited with starting the trend toward multiprocessing in routers with its Symmetric Multiprocessing architecture.

Newbridge and Cisco define specific tasks for each processor in their architectures. Wellfleet's Symmetric Multiprocessing architecture, on the other hand, calls for each interface module in its routers to perform all routing functions. As a result, each interface processor is responsible for packet forwarding, updating routing databases and responding to network management requests. Scalable performance and greater immunity to a catastrophic breakdown, such as the failure of the sole route processor, are obvious advantages of this symmetric approach.

#### When to switch, bridge or route

The former ironclad conviction that you route when you can and bridge if you must is not that simple anymore. To meet the insatiable demand for bandwidth, network designers must now decide when to put LAN switches, bridges and routers into service.

LAN switching, which provides plug-and-play operation at reasonable prices, is the device of choice in local environments. If you've got a lot of traffic on a local Ethernet, for example, employing switching gives you the best bang for your buck in terms of price/performance because the switch simply establishes point-to-point connections between devices at 10M bit/sec.

Bridging is best used for network segmentation. In situations where there's too much traffic on a LAN, bridges can be used to contain traffic to groups of users that frequently communicate. Bridging can also be used across WANs to tie remote LAN segments together.

Routers come into play in large environments comprising hundreds or thousands of nodes. Operating at the Open Systems Interconnection Network layer, sophisticated routers are used to divide the network into logical subnetworks and to direct the traffic flow among those subnets. For a technology comparison outlining the strengths and weaknesses of these devices, see the graphic on this page.

"The proper way to build a corporate network is to use bridging or switching at the lower layers and then use routers to connect local or remote clusters of LANs," says Larry Samberg, CrossComm Corp.'s vice president of technology.

"Routers aggregate [traffic from] the LAN switches, providing segmentation and routing between switch groups and the outside world," he says. This technique minimizes broadcast storms encountered with bridges and reduces the number of IP or Novell, Inc. IPX addresses required.

At the lowest layer of connectivity — the LAN infrastructure — switching is eclipsing bridging as the simplest alternative to satisfying bandwidth-hungry applications and servers. For example, when too many devices share an Ethernet, numerous collisions result in performance degradation.

"Traditional LANs, such as Ethernet and token ring, do not have sufficient capacity for high-bandwidth applications like high-resolution graphics," Samberg says. "One solution is microsegmentation, where the number of users per segment is reduced using bridging or routing." But when the number of users per segment is further reduced, bridging or routing becomes expensive on a per-port basis. LAN switching then becomes a more optimum solution

With the advent of Asynchronous Transfer Mode on the local network, another form of switching — much faster than current LAN switching — will enter the picture. Internetworking vendors, including Cisco Systems, Inc., Newbridge Networks, Inc., 3Com Corp. and Wellfleet Communications, Inc. — have announced new product architectures that include bridging or switching at the local network, routing of distributed LANs and ATM switching on either a local backbone or a wide-area basis. Future networks undoubtedly will employ multiple technologies for optimum end-to-end connectivity.

Technology comparison												
Capability	Routing	Bridging	Switching									
Ease of installation and configuration	Difficult	Easy	Easy									
Security/ Access control	Supports filtering of high-level protocols (SMTP, FTP)	Supports filtering of MAC addresses only	May be absent entirely									
Route computation	Sophisticated algorithms compute optimal routes	Uses basic spanning tree algorithm to avoid loops	Minimal or non- ' existent									
LAN interface support	Supports wide variety (Ethernet, fast Ethernet, token ring, FDDI, ATM)	May not support high-speed LAN interfaces	Supports wide variety (Ethernet, fast Ethernet, token ring, FDDI, ATM)									
WAN interfaces supported	Supports widest array	May support low- speed WAN interfaces	Supports LAN interfaces only									
ATM support	Available	Not available	Available									
Maximum throughput performance	225K packet/sec	280K packet/sec	240K packet/sec									
Price	Starts at \$2,000 per port	Starts at \$1,500 per port	\$350-\$1,200 per port ce: xyplex, inc., littleton, mass.									

The Symmetric Multiprocessing architecture is part of Wellfleet's strategy to keep routers at the forefront of enterprise networking. After all, routing and ATM technologies address many of the same issues, including backbone communications and workgroup connectivity, for high-bandwidth applications, says Mick Scully, Wellfleet's vice president of product management.

"Routers will not go away any time soon because of the installed base of legacy LANs, such as Ethernet," Scully says. "It took 10 years for the router industry to grow to its current stage. The ATM industry will take time to evolve, as well. However, the unanswered question becomes, how long it will take to grow to a similar size or greater market?"

In contrast to Wellfleet, 3Com Corp. taps a multiprocessing architecture to spread Reduced Instruction Set Computing (RISC) processors across its NetBuilder II chassis. The multiprocessing support enables 3Com to improve the performance and port density of its NetBuilder IIs, which previously only ran on a single processor.

Each RISC processor in the NetBuilder II operates across the same 800M bit/sec backplane. Compatibility with existing NetBuilder II I/O modules is assured. Thus, customers may use existing modules and new multiprocessing modules in the same chassis.

The various 3Com processors are based on AMD Co. 29000 RISC chips and designed with a client/server relationship. A central processor, called the Communications Engine Controller (CEC), acts as a server and communicates across the backplane — via a 3Com proprietary protocol called the Interprocessor Messaging System (IMS) — with intelligent interface modules that act as clients.

In 3Com's multiprocessor architecture, each intelligent interface module handles all packet processing chores if it maintains information about the route between sending and receiving devices. If the intelligent interface module does not maintain that information, it will use IMS to consult the CEC. The CEC will return the routing information, which the intelligent interface module stores in cache memory until it is needed again.

Because the IMS is software-based and does not rely on the architecture of the Net-Builder II, it can be retooled to run across any backplane, including those being developed for ATM switches.

For many network managers, ATM and multiprocessing issues are unimportant; they are simply looking for a way to incorporate LAN, WAN and SNA traffic into a cohesive internetwork backbone and have to sort through a dizzying number of vendor techniques.

#### **SNA SUPPORT**

Before any of the SNA internetworking alternatives can be evaluated, however, users need to understand the key difference between routing SNA and SNA routing, says Anura Guruge, a New Ipswich, N.H., independent consultant specializing in internetworking and IBM network architectures.

"Routing SNA, which most multiprotocol routers are capable of, is not the same as SNA routing, which these routers cannot do," Guruge says.

To route SNA, routers use one of many methods, including encapsulation techniques that wrap SNA traffic in some other protocol such as TCP/IP. SNA routing, on the other hand, requires routers to implement the same

type of SNA communications protocols that are used in IBM 37XX Communications Controllers that direct data flow between SNA terminals and mainframes. The rigors of SNA routing dictate extensive processing and memory requirements at the routing node.

An alternative to host-centric, SNA routing is IBM's Advanced Peer-to-Peer Networking-Network Node (NN), which allows worksta-

#### **ATM LAN links**

The seven router vendors claiming to support ATM LAN interfaces are:

CNT/Brixton Systems, Inc.

Lisco Systems, Inc.

Madge Networks, Inc.

NetEdge Systems, Inc.

Newbridge Networks, Inc.

Retix

Symplex Communications Corp.

tions to initiate communication without host involvement. Support for APPN-NN is included in IBM's 6611 router and 3Com's Net-Builder II. In July, 3Com announced additional support for APPN-NN over frame relay networks, providing another WAN alternative for SNA internetworks.

Most router vendors opt for techniques that either bridge SNA traffic or encapsulate it in another protocol. Regardless of the transport mechanism employed, the router must maintain the Synchronous Data Link Control connection to the end-user terminal. The three main methods used to maintain SDLC connections are SDLC pass-through, poll spoofing and SDLC-to-Logical Link Control 2 (LLC2) conversion.

With SDLC pass-through and poll spoofing, a predefined port at each router is assigned to accept SNA traffic from sending devices and basically fools the sending device into thinking it is communicating with a host. A transport protocol, such as IP or frame relay, is then used to carry the SDLC data on the link to the host, which is also being fooled into thinking it has a native terminal-to-host session by the router at the other end of the link.

With SDLC-to-LLC2 conversion, SDLC traffic is translated to LLC2, a protocol used in IEEE 802.2 token-ring LANs. This conversion enables SDLC devices to appear as if they are LAN-attached, allowing routers to use bridging or encapsulation techniques to forward traffic

In SDLC-to-LLC2 conversion, bridging is simpler to implement than encapsulation. The bridging can be done using either the source route bridging protocol, which is typically used with token-ring networks, or the transparent bridging protocol, which has traditionally been used with Ethernets.

With encapsulation, SNA traffic is stuffed inside another protocol — most often IP, the WAN routable portion of TCP/IP. When IP is used, the router at the receiving end pulls the SNA data from the IP packets and forwards it to the host. Cisco and 3Com support IP encapsulation techniques.

A variation of IP encapsulation, known as Data Link Switching (DLSw), developed by IBM and documented in the IETF's RFC 1434, is supported by a few vendors including Pro-

Continued on page 88

### Winner by Technical Knock Out



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## BASE SWITCH COMMUNICATIONS

vs tenders

Path buffering allows all ports to be fully utilized regardless of bandwidth usage and traffic patterns. Packets never experience unnecessary delays.

Flow control prevents network bottlenecks from causing lost packets while latency is kept to a minimum.

Fast address recognition allows throughput at full wire speed, regardless of address content.

	NEASE SWITCH	0-0-0
Parallel Non - blocking Architecture	Yes	No
Flow Control	Yes	No
Path Buffering: n(n-1) buffers	Yes	No
Runt Filtering (99% of bad frames)	Yes	No
Fast Address Decode	Yes	No
802.1d Compliant Aging*	Yes	No
Adjustable Latency** down to 10µs	Yes	No
Consistent Unlearned Address Broadcast	Yes	Νσ
Both AUI and TP Interfaces	Yes	No
Loses Frames	No	Yes

- Serial buffering makes new packets wait for older packets to be distributed to busy ports.
   Wait too long and they're dropped.
- Network bottlenecks cause massive increases in latency with excess packets being dropped completely.
- Inefficient two-stage address resolution slows unlearned and "chatty" traffic to a crawl.

- Efficient cache aging mechanism allows aging times as low as 10 seconds and guarantees that all entries in the cache are active.
- Runt filtering provides protection against 99% of bad packets. Individual segments are insulated from each other's runts.
- No lost packets, including those with broadcast, multicast, and unlearned addresses.
- Bloated aging mechanism allows a minimum aging time of 20 minutes. Networks with more hosts than cache entries bring the switch to its knees.
- No runt filtering. Bad packets make their way to whatever segment they feel like, eating away at other segments' valuable bandwidth.
- Frequent packet loss, especially ones with broadcast, multicast, and unlearned addresses.

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#### Routers

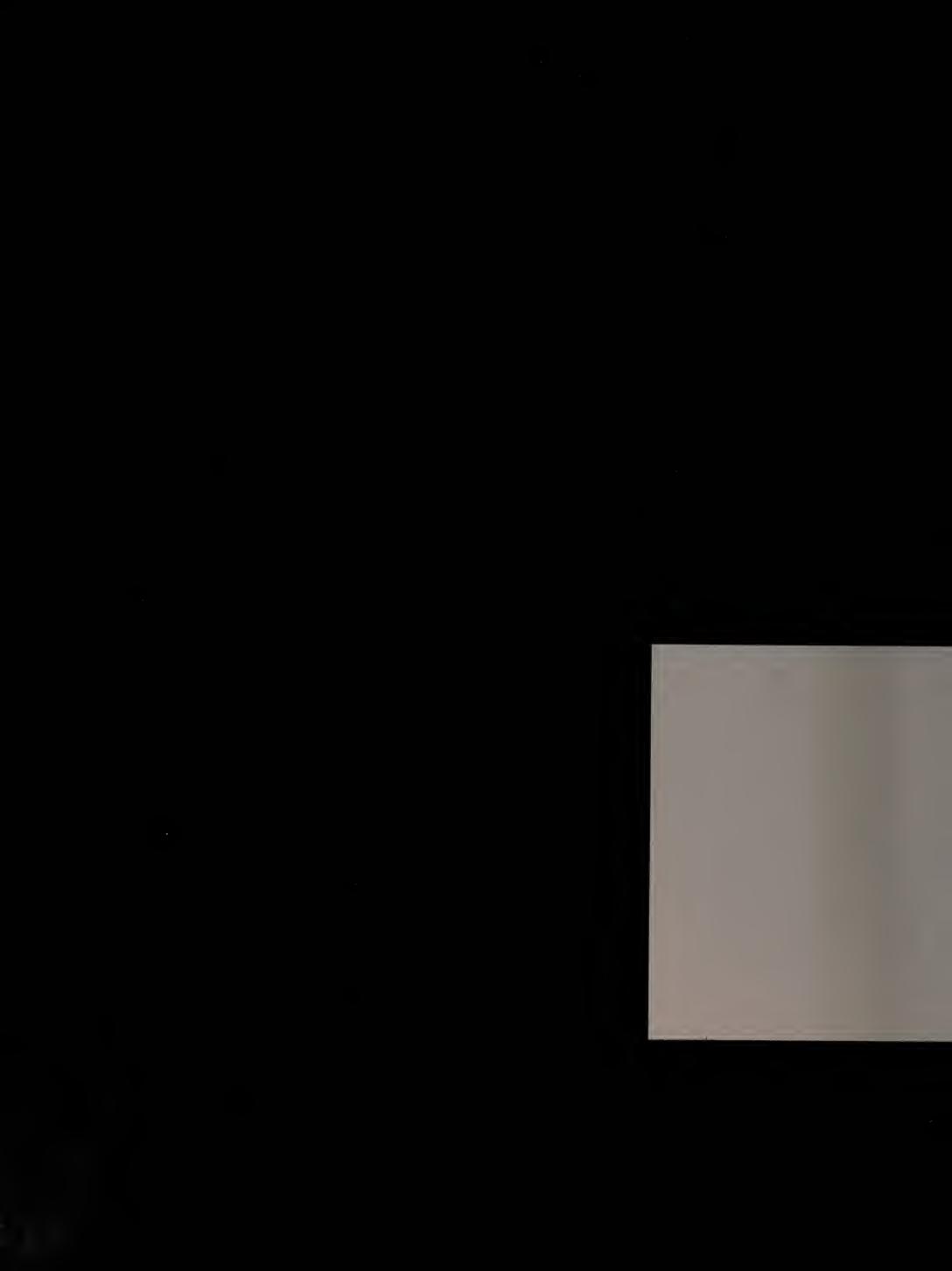
Company	Product	Plat- form	Туре	CPU	LAN		WAN	IS		Routing protocol	I	anspo		,	.,		support	Throughpour (K packet/			Compres- sion	Bridg- ing	- Mgmt.	Priv
		B = Stand-alone box P = PC-based S = Software-only O = Other		1	Max. no. of interfaces	E = Ethernet T = Token ring F = FDDI TP = TP-PMD FE = Fast ethernet L = LocalTalk	Max. no. of interfaces	Service Interfaces: F = Frame relay I = ISDN S = SMDS T = T-1/Fractional T-1	Physical Interfaces: H = HPPI  V = V.35 HS = HSSI  X = X.21 S = Serial  0 = Other	1 = 1S-1S 0S = 0SPF R = RIP 0 = Other	AppleTalk	VINES	DECnet ISO CLNP	ISO CENP	ddd		A = APPN D = Data switching E = Encapsulation Through	Ethernet: 64-byte/1.5K-byte packets	Token ring: 64-byte/4.1K-byte packets	FDDI: 64-byte/4.1K-byte packets	E = Entire pecket H = Header only P = Payload only	S = Source routing ST = Source routing transparent T = Transparent	N = NetView S = SNMP P = Proprietary 0 = Other R = RMON	1
tvanced omputer	ACS/4200	В	R	1	3	E, L, T	6		S, V, X,	OS, R, O	V	-		V	V .			5.5/5		NA	E	ST, T	S	\$5,7 \$8,3
mmunications 0) 444-7854	ACCes/4500	0	E	10	40	E, F, T	20		S, V, X,	OS, R	V	-	1	V	V 1	V		(1)/(1)	5/(1)	28/(1)	E	ST, T	S	\$8, \$9, \$10
,	Amazon Bridge/Router	В	R	7	5	E, L, T	18	F, I, S, T	S, V, X,	OS, R, O	V	-	1	V	V	7		14.8/(1)	3.6/3.3	NA	E	ST, T	S	\$7 \$2
	Danube Bridge/Router	В	В	1	1	E	1		S, V, X,	OS, R, O	V			~	V :	7		1.5/.065	NA	NA	E	T	S	\$1 \$2
	Nile Bridge/Router	В	В	1			2	F, I, S, T	S, V, X, O	OS, R, O		~	1	~	v .	~		3/.15	3/.12	NA	E	ST, T		\$2 \$5
	Tahoe Bridge/Router	В	С	1	2	E, L				OS, R, O		~	1	~		7		14.8/(1)	NA	NA		T	S	\$2 \$3
drew Corp. 0) 776-6174	PW 6100N	В	С	1			2		S, V, X, O	OS, R, O		V				~		3/.15	3/.12	NA	E	S, T	S	\$4 \$6
<u></u>	PW 6200	В	R	1	3	E, L, T	4	F, I, S, T	S, V, X, O	OS, R, O	V	~		V	V 1	7		5/.225	3.6/.18	NA	E	S, T	S	\$4 \$8
ck Box Corp. 2) 746-5500	RISC Bridge/Router	В	С	1					0	R, O	V	~		V	v .					NA		T	P, S	\$7 \$1
yman stems, Inc.		В, О	R	1	3	E, L	2	I, T	S, V	R, O	~	~	1	V	V 1			3.5/.813	NA	NA			S	\$2 \$3
7) 932-1100	Gator Route iR		R	1						R, O	V	~			V 1					NA			S	\$2
co stems, Inc.	Cisco 2500	В	R	1		E, T			S, V, X, O	I, OS, R, O		V V							4/(1)	NA	E	S, ST, T		\$2 \$5
0) 553-6387			R	1					S, V, X, O	I, OS, R, O		V V						14/(1)	14/(1)	14/(1)	E	S, ST, T		\$4 \$7
			E	1					H, S, V,	0										80/(1)	Е	S, ST, T		\$9
				12					X, O	I, OS, R, O	1	V V	V						20/(1)	110/(1)	E	S, ST, T		\$1 \$1
IT/Brixton stems, Inc. (0) 274-9866	BRX Internetworking Suite 2.0	S	В	(2)		E, F, FE, T, TP	64	T	S, V, X	OS, R		4			V 6		A, L, P	(2)/(2)	(2)/(2)	(2)/(2)	Н		N, P, S	S \$7 \$3
		В	В	1		E	1		S	R, O	V	~	1	V	V 1	7		2/.084	NA	NA	Н		P, S	\$1
00) 356-0283	<del></del>	В	С	4	4	E, FE, L				R, O	V	~		V		v		14.8/.812	NA	NA			P, S	\$3
ay mmun <del>i</del> cations,	BR 6100	В	В	1	1	E	3	F, I, T	S, V	OS, R		4		~	7	~		2.5/.62	NA	NA		T	S	\$2
ommunications, c. 00) 367-2729	BR 6108	В	В	1	1	E	11	F, I, T	S, V	OS, R				V	~ .	7		2.5/.62	NA	NA		T	S	\$4
10, 00, 1			B	1		+ '			S, V V, X, O	OS, R I, OS, R,		V		V	V V					NA NA				\$4
ossComm	Access Router XL2 Integrated		В	1		E, T				0	V	V		V							E	ST, T	S R, S	\$3 \$4 \$9
orp. 00) 388-1200	Branch Router																			NA.		31,		\$2
	Branch Router		В	1						OS, R, O		V		V						NA	Ē			\$1 \$3
	XL10 Integrated Branch Router	В	В	4	2	E, T	6	F, T	S, V, X	OS, R, O	~	~		~			L, P, S	8/.4	8/.24	NA	E	ST, T	R, S	\$1 \$1
	XL20 MidRange	В	R	8	8	E, T	12	F, T	S, V, X	OS, R, O	~	V		~		v L	L, P, S	14.8/.8	15/.496	NA	E	S, ST,		\$4 \$3
	Router	В	E	32	32	E, T	48	F, T	S, V, X	OS, R, O	V	V	H	V	H	V L	L, P, S	14.8/.8	15/.496	NA	E	S, ST,	R, S	\$1
	Router XLIBN	В	В	1	1	E, T	2	F, T	S, V, X	OS, R, O	V	V		V		VL	L, P, S	8/.4	8/.24	NA	E	ST, T		\$1 \$5
	Integrated Branch Router																							\$1
ayna ommunications, c.	PathFinder	В	R	1	2	E, L				0	~							(1)/(1)	NA	NA			Р	\$7
01) 269-7200 evelcon ectronics, Ltd.	Orbitor	В	В	1	1	E	2	I, T	V, X, O	R				~		V		.92/.09	NA	NA	Ē	T	S	\$2 \$4
00) 667-9333 igital		В	E	30	14	E, F	56		S, V, X,	I, OS, R,	V	A,	V	V	V	1		14.2/.812	NA	49/2.38		T	P, S	\$6
quipment Corp. 300) 344-4825	500/600 DECwan-	B, O	В	1		E	1		O S, V, X,	I, R, O	H	V				V				NA NA			P, S	\$1 \$1
	router 90 DECbrouter 90	В, О	B, R	1	1	E	2	F, T	O S, V, X,	I, OS, R,	V	VV	V	V	V	7					Н		S	\$1
	DI-2000 IP/IPX		В	1	2		1.		0	OR	H	H			VV					NA			P, R, S	\$3
ystems, Inc. (00) 326-1688																								\$3

FOOTNOTES:
(1) Vendor did not supply information.
(2) Dependent on chosen hardware.
(3) Supports ATM interface.
(4) Now owned by Cisco.

CLNP = Connectionless Layer Network Protocol
HSSI = High Speed Serial Interface
HPPI = High Performance Parallel Interface
IS-IS = Intermediate System to Intermediate System
LLC = Logical Link Control

NA = Not applicable
RIP = Routing Information Protocol
RMON = Remote Monitoring
TP-PMD = Twisted Pair-Physical Media Dependent





#### Routers (continued on page 92)

Company	Product	Piat-	Туре	CPU	LAN	3	WAN	ls		Routing	Tra	anspo	ort pr	otoc	oi		SNA	Throughp			Compres-	Bridg-	Mgmt.	Price
		form	\$ 5 8 E	0 1 0	<b>\$</b>	g Q	ses	<u>.</u> [	Per Per	protocol	善	VINES	te le	E X	ррр			(K packet/		ets	sion ¥ ≥ È	ing	SNMP	-
		alone 1	Boundary Campus Enterprise Regional	Max. no.	of interfac	Token ring = TP-PMD	of interfaces	Interfaces ne relay I S Fractional	v = V.35 X = X.21 O = Othe	1= IS-IS OS = OSPF R = RIP O = Other	AppleTalk	N N	DECnet	-   C	•	TCP/IP	Poll spoofing SDLC pass- through	e/1.5K-byte packets	Token ring: 64-byte/4.1K-byte packets	FDDI: 64-byte/4.1K-byte packets	Entire packet Header only Payload only	franspar	S = SN = 0	
		Stand- PC-bar Softwa Other	800 M 85		ė		ax. no. of	rame r rame r DN MDS	2	-0mo	~						P = Poll S = SDL thr	5K-byt	1K-byt	1K-byt	H = Ent	ng ting tra		
		8 11 11 11			Mex.	t hernet k	Max.	Service In F = Fram I = ISDN E = SMDS	Physical In H = HPPI HS = HSSI S = Serial		L		4	Ш		Щ			by te/4.	bуте/4.	w.r.c.	S = Source routing ST = Source routing t T = Transperent	NetView Proprietary FMON	
						E = Ethernet F = FDDI FE = Fast ethe L = LocalTalk											N switching ipsulation	Ethernet: 64-by	ng: 64-	DI: 64-		Sourc = Sour Trans	20.00	
						######################################											= APPN = Data s = Encap = LLC	Ethern	ken rir	E		ST		
E stern		В	В	1	1	E	1	F, I, T	S, V, X,	OS, R	-		H	V	~	V	LEDA-	4/.17	NA NA	NA	E, H, P	T	S	\$1,995-
e arch, Inc.	SPN2500 SpanNet SPN4500	В	R	1	1	E	2	F, I, T	S, V, X,	OS, R	$\vdash$		t	~	~	~	E	8/.34	NA	NA		Т	S	\$3,495 \$4,000-
		В	R	1	1	E	2	F, I, T	S, V, X,	OS, R	1			~	~	~	E	8/.34	NA	NA	E, H, P	Т	S	\$6,500 \$2,500- \$5,000
Eicon Technology	IP Router	Р	R	(2)			24	F, I	V, X	I, OS, R, O						1		(2)/(2)	(2)/(2)	(2)/(2)	E		S	\$995
Corp. (800) 803-4266	Titoutor ioi	Р	R	(2)	(2)	E, T	6	F, I	V, X, O	R	V			~	V	~		(2)/(2)	(2)/(2)	NA	E		Р	\$995-
	NetWare InterConnect	P	R	(2)	(2)	E, T	6	F, I	V, X, O	R	~			V	V	V		(2)/(2)	(2)/(2)	NA	E		S	\$2,346 \$1,195-
	Router for NetWare IP Router for	P	R	(2)	(2)	E	16	F, 1	S, V, X,	R			1		~	~		(2)/(2)	(2)/(2)	NA	F		S	\$2,540 \$995-
F ration	Windows NT StarRouter	В, О	С	1		E, L		','	0, 1, 7,	R, O	V					~		1.5/1.5	NA NA	NA			S	\$2,340 \$3,295
Computing, Inc. (510) 814-5000	InterRoute/5	В, О	С	1		E, L				R, O	V		V			V	0 - 1	1.5/1.5	NA	NA			S	\$3,495
Gandalf Technologies,	LANLine 5250L High	В	C, E	1	2	E				R				~		~		12.5/.811	NA	NA		Т	S	\$1,995
Inc. (800) 426-3253	Performance Local Router LANLine	В	В	1	1	E	2	т	S, V, O	R				~	~	V		12.5/.811	NA	NA	F	7	S	\$2,995
-	5250i High Performance	В	В	1		_	2	<b>'</b>	3, V, O	n	ı							12.5/.011	INA	INA			3	\$2,995
	Remote Access Router																							
Hewlett- Packard Co.	HP AdvanceStack	0	R	5	16	E, F, FE, T	16	F, I, S, T	S, V, X	OS, R, O	-	ľ		~	~	~	D, E, \$	14.8/.812	(1)/(1)	(1)/(1)	E	S, ST,	S	\$7,995- \$25,475
(800) 533-1333	Router 650 HP Router BR	В	С	1	5	E, F				OS, R, O	~		/	~		~		14.8/.812	NA	(1)/(1)	E	S, ST,	S	\$12,500
	HP Router ER	В	R	1	2	E	2	F, I, S, T	S, V, X,	OS, R, O	~	•	/	~	~	~		11.58/ .812	NA	NA	E	S, ST,	S	\$3,799
	HP Router FR	В	В	1	1	E	1	F, I, S, T	S, V, X, O	OS, R, O	1	•	/	~	~				NA	NA	E	S, ST, T		\$2,499
		В	С	1	4	E				OS, R, O		ľ		~		~		14.8/.812		NA	E	S, ST, T		\$7,500
		В	В	1	1	E	1		S, V, X, O	OS, R, O						~		(1)/.812	NA	NA	E	S, ST, T		\$1,899
	HP Router SR	В	B	1	1	E, T	3		S, V, X, O S, V, X,	OS, R, O OS, R, O			/	1	V		D, E, S	11.58/ .812 11.58/	NA (1)/(1)	NA NA	E	S, ST, T S, ST,	L.	\$3,299
Hughes Network	S8000 Ethernet		B, R	2	4	E, ,	8		S, V, X, O S, V, X,	R				V			<i>U</i> , E, 3	.812 4.5/(1)	NA	NA NA		T T	S	\$7,000-
Systems, Inc. (301) 601-4299	Router S8000 LANpad			2	2	E, T	10	F, I, T	O S, V, X,	R			-	V		V	A, D, L,	2/.064	2/.064	NA		T	S	\$19,000 \$9,000-
Hypercom, Inc.		В	В	1	1	E, T	1	F, I, T	O S, V, X	OS, R	V	1		V	V	~	P L, P	8.8/.5	8/.2	NA	Р	S, T	P, S	\$21,000 \$2,400-
Network Systems division	Network 1000	0	В	6			0		CVV	00 0	V							14.0/05	14/05	ALA.	D	СТ	0.0	\$7,900
(800) 577-5501	Integrated Enterprise Network 3000	0	В	Ь	5	E, T	2	F, I, T	S, V, X	OS, R						~	L, P	14.8/.65	14/.25	NA		S, T	P, S	\$5,500- \$18,000
	Integrated Enterprise	0	R	16	15	E, T	8	F, I, T	S, V, X	OS, R	V	1		V	V	~	L, P	14.8/.65	14/.25	NA	P	S, T	P, S	\$7,700- \$14,200
		0	E	32	31	E, T	16	F, I, T	S, V, X	OS, R	V			V	~	1	L, P	14.8/.65	14/.25	NA	P	S, T	P, S	\$9,600-
IBM	Enterprise Network 6000	В	E	8	7	E, T	14	F, T	S, V, X	OS, R, O		V 1					A, D	8, 1/,81	5.8/.486	NA		ST, T	9	\$16,100
(914) 642-4057	Network Processor	U				L, 1	14	, ,	5, V, X	03, H, U							Λ, υ	0.17.01	5.0/.480	IAV		01, 1	3	\$1,500-
Madge Networks, Inc.	Smart 16/4 MC32	Р	В	(2)	5	E, F, T, TP	10	F, T	V, X	I, OS, R, O						~		(1)/(1)	19.5/ .265	(1)/(1)		ST	N, R, S	\$1,395- \$5,225
(800) 876-2343	Bridgenode Smart 16/4	P	В	(2)	5		10	F, T	V, X	I, OS, R,	V			~		~		(1)/(1)	19.5/	(1)/(1)		ST	N, R,	\$1,395-
	EISA Bridgenode Smart	В	С	1	2	ТР				O R				~				NA	.265	NA		ST	S N, R,	\$6,975 \$5,495
	Ringbridge	Ь	В	(2)		E, F, T,	10	F, T	V, X	I, OS, R,						~		(1)/(1)	19.5/	(1)/(1)		ST	N, R, S N, R,	\$1,045-
Memotec	Bridgenode ConnectLAN	В	B, R	1		TP E, T		F, I, T	V, X, O	OS, R	V	V		~	V	~		1.5/.065	.265	NA NA	E	T	S P, S	\$5,225 \$2,195
Communications, Inc.	2800 ConnectLAN			1				F, I, S, T				V 1	/			~		3/.15	3/.12	NA ·	E	S, T	P, S	\$3,000-
(508) 681-0600	5050 ConnectLAN	В	B, R	1				F, I, S, T			V	V 1	/			~				NA	E			\$5,500
Motorola	5300 6520 MPRouter	В	В	1:,	1	E, T	19	1000	S, V, X,	R	1		1	~		~	Р	(1)/(1)	(1)/(1)	NA		ST, T	P, S	\$3,200-
Information Systems Group, Network Systems																								\$15,000
Division (508) 261-4000																								



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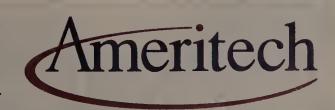
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Your Link To Better Communication

#### Continued from page 80

teon, Inc. and Wellfleet. DLSw provides multiple functions: IP encapsulation of SNA, APPN and Network Basic I/O System (NETBIOS) traffic; SDLC-to-LLC2 conversion; and media access control (MAC) address and NETBIOS name caching (NW, June 13, page 53.)

Using frame relay to transmit SNA data is defined in the IETF's RFC 1490. This process encapsulates SNA traffic inside a frame relay datastream, which is then sent to the mainframe via a 3745 Communications Controller. Hypercom, Inc.'s Network Systems division uses frame relay as its basis for SNA transport.

Then there are the proprietary methods such as CrossComm Corp.'s Protocol Independent Routing (PIR). "In designing PIR, our goal was to develop a technique for routing nonroutable protocols — one that would supplement other routing protocols such as RIP and OSPF," says Larry Samberg, vice president of technology at CrossComm. "PIR can carry any type of traffic, not just SNA."

PIR assigns a network number for every MAC layer address on the network. Packet forwarding decisions can then be made on a network-by-network basis, even if the original protocol did not contain Network layer functionality. These straightforward address assignments also allow for traffic prioritization, load balancing and fast convergence following a link failure.

"The biggest advantage of PIR is that it is plug-and-play, while IP and frame relay encapsulation requires more extensive configuration," Guruge says. "But with the current interest in TCP/IP-based internetworking, IP

encapsulation should be the most prevalent technique in the short term. In the long term, additional vendor support for APPN will make that technology an alternative to IP and frame relay encapsulation."

#### **GETTING AROUND FAILURES**

As routers are tapped to carry internetwork and SNA traffic, it behooves net managers to keep a close eye on router operation for near 100% uptime. The three most critical fault-tol-



erant elements to look for in routers are redundancy of critical components, the ability to exploit that redundancy quickly when a failure does occur and quick nondisruptive failure repair.

Router vendors have been supplying faulttolerant capabilities for some time. And users are increasingly placing more emphasis on their availability in the selection process.

For instance, router reliability was the key purchase criterion for Debra D'Entremont, a network analyst at New England Medical Center, a Boston hospital serving 3,000 users in 13 buildings. "Since our network must be operational 24 hours per day, reliability was our key purchase criterion," she says.

D'Entremont selected Wellfleet's Link Node and Concentrator Node routers partly for their fault-tolerant features and partly on the recommendation of Medford, Mass.-based Tufts University, which is affiliated with New England Medical Center. "As a teaching hospital, interoperability between our affiliates is essential, and selecting a single vendor for all locations gave us that additional assurance."

Fault management and the ability to recover from WAN link failures were significant selection criteria for Dennis Holman, principal technical consultant for Landis & Gyr Powers, Inc., a building controls and automation contractor headquartered in Chicago.

Holman's network currently serves 1,500 users in 20 locations, with plans to add another 30 sites by the end of next year. He recently went through a conversion from analog multipoint lines to frame relay service.

"Our branch offices were used to having automatic dial backup if a communications link failed, and when we moved to the frame relay network, we needed to maintain this capability," Holman says. That is one of the reasons he selected Cisco 2500 and Cisco 4000 routers, both of which provide redundant WAN link support.

Just as important as fault tolerance i throughput performance. But judging through put is one of the toughest tasks in router select tion. Despite strides made to develop standard benchmarking tests, vendors still quote confusing packet-per-second forwarding rates that can exceed theoretical limits.

#### THROUGHPUT AND PERFORMANCE

Benchmarking the performance of internetworking devices, such as bridges and rout ers, is a serious vocation for Scott Bradner, consultant with Harvard University's Office of Information Technology and the former chairman of the Internet Engineering Task Force's Benchmarking Methodology Working Group (BMWG). Bradner regularly conducts perform mance tests in Harvard's Network Device Tes Lab to determine router performance.

'Our lab accomplishes several objectives including an independent resource for end users and truth in advertising for vendors, Bradner says. "The vendors with good thing to show have always been cooperative. Those vendors with less than stellar products are another story, however."

In gathering information for the Buyer' Guide chart starting on page 84, vendors were asked to provide throughput rates for two packet sizes in Ethernet, token-ring and FDDI environments that would simulate real-world conditions. Vendors were asked to quote fig ures based on tests that adhered to a method ology of measuring throughput between two interfaces, such as Ethernet to Ethernet, or token ring to token ring, on a single router.

Continued on page 90



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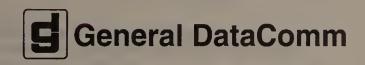
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#### Continued from page 88

The responses show that Bradner is perhaps correct. The vendors were sporadic in reporting results, often submitting information for one LAN type only or for one packet size and not others. Some even initially reported performance figures that exceeded theoretical limits and were asked for clarifica-

Results of tests conducted at Harvard reveal that most high-end routers perform at or very close to the theoretical limits for packet throughput. With 64-byte packets, these upper

limits are 14.8K packet/sec for Ethernet, 24.7K packet/sec for 16M bit/sec token ring and 152K packet/sec for FDDI.

'There does not seem to be a great deal of difference in the per-port numbers for the central forwarder router, like Cisco, vs. the multiprocessing router, like Wellfleet," Bradner says. "In theory, the multiprocessor architecture scales better, but in practice, the two designs produce very similar results.'

Much of Bradner's work is based on the continuing efforts of the BMWG, a committee comprising end users, test equipment vendors

and hardware manufacturers. One of the group's key contributions has been RFC 1242, which defines testing terminology.

"Clear definitions reduce the likelihood of vendor or product bias in test procedures," says Jim McQuaid, team leader of internetwork operations at test equipment vendor Wandel & Goltermann Technologies, Inc. in Research Triangle Park, N.C., and current BMWG chairman. "This, in turn, yields better results that end users can base their purchase decisions on."

The BMWG is currently writing a draft

document titled "Benchmarking Methodology for Network Interconnect Devices. This paper describes testing procedures and methods, such as specific frame sizes, so that tests have an even more common methodology.

Throughput benchmarks were useful in the selection process for Tom Kochel, network administrator for Cub Foods, a supermarket chain based in Stillwater, Minn. Cub Foods now depends on Cisco routers to transmit weekly price updates for 180,000 items stocked in each of its 35 stores, with 75 more expected to open by early next year.

"Our prices must be constantly adjusted to stay competitive, with as many as 15,000 prices per store changing each week," Kochel says. "To complicate the matter, prices may vary between cities, which results in lots of bandwidth being consumed - just for the pricing, not to mention payroll or other business

operations."

On top of good throughput benchmarks, Cub Foods was able to get the type of remote management options it wanted with thirdparty tools that work with Cisco products. Foods selected Novell's NetWare Management System coupled with Bohemia, N.Y.based StonyBrook Services, Inc.'s RouterManager application soft-

Get the results

**Results of router** performance tests conducted at Harvard University's **Network Device** Test Laboratory in accordance with the IETF's methodologies are openly available on the Internet. They are stored on host hsdndev.harvard.edu and can be found in directory/pub/ndtl.

ware. Both are compatible with Cisco routers and enables Cub Foods to keep close tabs on its remote office operations.

#### **BRANCH OFFICE CONNECTION**

Making the installation of branch office routers as painless as possible is another oftentouted user requirement. "Many of our clients are coming from a mainframe environment into client/server computing for the first time, with limited networking experience," says Larry Gray, computer specialist for the Naval Computer and Telecommunication Station in Newport, R.I.

Gray's group provides consulting services to various naval commands and recommends networking hardware to groups of between 50 and 1,000 users. "How easy it is to install and configure a device plays an important role in our product selection process," Gray says. "In addition, we look for a migration path to new LAN and WAN technologies, such as [100M bit/sec] fast Ethernet, frame relay and ATM, to maximize the taxpayers' investment in this equipment."

And vendors are starting to listen to users' demands for easily installed branch office routers by coming out with fixed-port, preconfigured units and even software-based routers that run on existing workstations or servers.

"Our customers frequently ask us how to connect remote offices into the enterprise network," says Mark de la Vega, product-line manager of NetWare enterprise products at Novell. "Many alternatives exist, but finding one that is cost-effective, especially when the remote traffic requirements are low, is the real

Continued on page 93

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#### Routers

Company	Product	Plat-	Туре	CPU	LANS	5	WAN	Ns		Routing	Tra	ınspor	t pro	otoco	) 	SNA	Throughp	ut		Compres-	Brldg-	Mgmt.	Price
Company	form			5	protocol		· σ =				support	(K packet	K packet/sec)		slon	ing							
		B = Stanc P = PC-br S = Softw O = Other				E = Ethernet T = Token ring F = FDDI TP = TP-PMD FE = Faat ethernet L = LocalTalk		Service interfaces: F = Frame relay I = ISDN S = SMDS T = T-1/Fractional T-1	Physical Interfaces: H=HPPI V=V.35 HS=HSSI X=X.21 S=Serial 0=Othe	I = IS-IS 0S = 0SP R = RIP 0 = Other	AppleTal	VINES	ISO CLNP	XdI	PPP	A=APPN D=Data switching S=SDLC pass- E=Encapsulation through	Ethernet: 64-byte/1.5K-byte packets	Token ring: 64-byte/4.1K-byte packets	FDDI: 64-byte/4.1K-byte packets	E = Entire packet H = Header only P = Payload only	S = Source routing ST = Source routing transparer T = Transparent	N = NetVlew S = SNMP P = Proprietary 0 = Other R = RMON	
NEC America, Inc., Data Communications Systems Division (800) 222-4632	Dr. Bond	0	B, R	1	36	E	36	I, T	S, V, O	R	~			~	V V	E	(1)/(1)	NA	NA	H, P		S	\$3,090- \$10,000
NetEdge Systems, Inc. (919) 361-9000				2		_,,,,	4		S, V, X	OS, R, O				~	VV		14.88/(1)	17.5/	50/15		ST, T	S	\$12,750- \$61,750
Application	LANB/290 Multiprotocol Router	В	R	1	1	E	1		S, V, X, O	R				-	~		(1)/(1)	NA	NA		Т	S	\$1,495
Network	NE ISDN Router	В	В	8	2	Е	32	F, I, T	S, V, O	R	~	VV		~	v v	S	14.88/(1)	NA	NA		T	P, S	\$6,500- \$22,100
(313) 761-5005		В	В	8	2	Е	48	I		R					V V		14.88/(1)	NA	NA	E	T	S	\$9,600- \$19,900
Network		В	В	3	2	E, L	2	F, I, T	S, V, O	R, O	~			~	~ ~		(1)/(1)	NA	NA	Н	T	S	\$2,695- \$4,190
(408) 383-9300		В	C, E, R	7	5	E, L	3	F, I, T	S, V, O	R, O	~			~	v v		11.58/	NA	NA	Н	T	S	\$5,995
Network	6200	В	В	1	1	E	1			OS, R, O	~	V		V	VV		14.88/	NA	NA		T	S	\$1,795
(612) 424-4888		В	R	1	16	E	18	F, T		OS, R	~	~		~	VV		14.88/(1)	NA	NA		Т	S	\$5,999- \$21,184
		В	E	12	16	E, F, T	16	F, S, T		OS, R	V	~		~	v v	L	13.39/.71	(1)/(1)	10.5/		S, ST,	P, S	\$21,184
		В	E	1	5	E, F, T	4		S, V, O S, V, O	R	V	V V		~	V V	L	14.6/.715	(1)/(1)	2.125		ST, T	N, P, S	\$57,500 \$4,995-
		В	E	30				F, S, T	H, HS,	OS, R	V	V		~	VV	L	13.39/.71	(1)/(1)	2.125		S, ST,	P, S	\$21,787 \$15,500-
	Bridge/Router		B, R	1	1		2	J	S, V, O	R				~		E	4/.168	NA .	2.125 NA	E	S	P, S	\$100,000 \$2,295- \$3,295
Newbridge	Vivid RouteServer	S	С	2	2.4 K	E	8	(3)		OS, R				~	~		14/(1)	NA	NA		Т	P, S, R	\$10,000
(703) 834-3600	LAN2LAN/MPR	P	E	13	4	E, T	24	F, I, T	S, V, X,	R	V			V	VV		14.71/.81	(1)/(1)	NA	E	т	P, S	\$795-
Systems	Enterprise LAN2LAN/MPR								S, V, X, O S, V, X,	R					VV		14.71/.81	(1)/(1)	NA NA	E	T	P, S	\$3,595 \$795-
(714) 752-1511 Northern Telecom, Inc.	Remote Office								0	OS, R	(1)	(1) (1)	(1)		(1) (1)		(1)/(1)	(1)/(1)	NA	Н	S, ST,		\$2,590 \$2,400- \$14,400
(800) 667-8437 OST, Inc. (703) 817-0400	Magellys	P	В	(2)	3	E, T	6	I, T	S, V, O	R, O				~	~		(2)/(2)	(2)/(2)	NA	P		P, S	\$3,995-
(703) 817-0400	Magellys E	В	В	1 .	1	E	3	F, T	V, O	R	~			V	VV		(1)/(1)	NA	NA	E	T	S	\$8,995 \$1,795-
	The Link	S	В	(2)	1	L	4	ı	0	0	V						NA	NA	NA	E		P	\$2,495 \$1,595-
	LanXpand	S			2	E, T	6	1	V, O	0				V	+		(2)/(2)	(2)/(2)	NA			0	\$4,595 \$995-
Penril Datability	NetWare		В	1	1	E .				OS, R, O					VV		(1)/(1)	NA NA	NA		T	P, S	\$1,495 \$1,995
Networks			R	1		E			0	OS, R, O		V			V V		14.88/.82		NA		Т	S	\$2,795
	BRX 5611	В	B	1	1	E	1	F, T	S, V, O	OS, R, O OS, R, O	V	V		~	V V V			NA	NA NA		T	P, S	\$2,195 \$2,495
	BRX 5641	В	B, E	1	4	E	1	F, T	S, V, O	OS, R, O	~	V		~	VV		14.88/.82	NA	NA		T	S	\$3,295
		В	E R	1	1	E	2	F, T	S, V, O	OS, R, O OS, R, O	V	V		1	V V		14.88/.82	NA	NA NA		T	S P, S	\$2,995 \$3,095
			E	1						OS, R, O		~		_	VV			4.5/(1)	NA		S, ST,		\$5,995
Proteon, Inc. (800) 830-1300	CNX 400	В	R		12		12	F, I, T	S, V S, V, X, O					~		D, L, S	.08/.08	NA NA	NA NA	H H	S, ST,	P, S S	\$2,999 \$6,850- \$21,850
		В	R	1					S, V, X, O			V V	~	~	V V	D, L, S	(1)/(1)	NA	NA	Н	S, ST, T	S	\$10,895- \$34,900
	CNX 600	В	Е	2	20	E, F, T	20		S, V, X,	I, OS, R	~	~ ~	~	~	VV	D, L, S	(1)/(1)	(1)/(1)	NA	Н	S, ST,	S	\$16,900- \$56,900
	DNX 300	В	В	3	2	E, T	2	F, T	S, V, X,	I, OS, R	~	VV	V	V	VV	E, S	6.5/(1)	6/(1)	NA	Н	S, ST,	S	\$3,995- \$5,395
	DNX 350	В	В	3	1	E, T	4		S, V, X	I, OS, R	~	VV	~	~	VV		6.5/(1)	6/(1)	NA	Н	S, ST,	S	\$5,095-
RAD Network	OpenGate C12	0	E	14	48	E, F, T	24	Т	S, V, X	R, O		~		~	~	P, S L, P, S	14.4/.82	24.7/.48	35/(1)		S, ST,	R, S	\$5,995 \$7,450-
Devices, Inc. (714) 436-9700		0	R	5	16	E, F, T	8	Т	S, V, X	R, O		V		V	~	L, P, S	14.4/.82	24.7/.48	35/(1)		S, ST,	R, S	\$100,000 \$3,950-
		В	В	1			2			R, O		V		V			14.4/.82	24.7/.48			S, ST,		\$30,500 \$3,295-
	MAR OpenGate	В	В	1		E	1		S, V, X,			V		V		L, P, S		NA	NA		T	S	\$6,895 \$1,995
	RAN/ET		В	1		T	1		0	R		V		V	200	A Parket	NA	3.2/.16	NA		S, ST,		\$2,495
Retix	RAN/TR			5	12	E, F, T	24	1	S, V, X, O S, V, X,	I, OS, R					VV	1	14.88/	(1)/(1)	(1)/(1)		S, ST,		\$2,495
(310) 828-3400	XChange 7000 Model 7500	B		3	12	E, I, I	24	F, 1	S, V, A, O	1, 03, 11						U	.627	(1)/(1)	(1)/(1)		5, 51, T	3	\$50,000





#### Routers

Company	Product	Piat- form	Туре	CPU	LAN	s	1AW	ls		Routing protocoi	Tra	nsp	ort p	rotoc	oi		SNA support	Throughp (K packet			Compres- sion	Bridg- ing	Mgmt.	Price
		B = Stand-alone box P = PC-based S = Software-only O = Other		Мах. по.	lax, no. of interfaces	E = Ethernet T = Token ring F = FDDi TP = TP-PMD FE = Fast ethernet L = LocaTalk	Max, no. of Interfaces	Service Interfaces: F = Frame relay I = ISDN S = SMDS T = T-1/Fractional T-1	Prysical interfaces: H=HPPI V=V.35 HS=HSSI X=X.21 S=Serfal 0=Other	I = IS-IS OS = OSPF R = RIP O = Other	AppleTalk	VINES	DECnet	ISO CLIN	ddd	TCP/IP	ofing ass-	Ethernet: 64-by e/1.5K-byte packets	Token ring: 64-by e/4.1K-byte packets	FDDI: 64-byte/4.1K-byte packets	E = Entire packet H = Header only P = Payload only	S = Source routing ST = Source routing transparent T = Transparent	N = NetVlew S = SNMP P = Proprietary O = Other R = RMON	
Retix	Router XChange 7000 Model 7260	В	R	1	3	E, T	3	F, T	S, V, X, O	I, OS, R	V		V	"	~	7	D, E	(1)/(1)	(1)/(1)	NA	E	S, ST, T	S	\$4,250- \$6,500
	Router XChange 7000 Model 7240	В	В	1	2	E, T	2	F, T	S, V, X, O	I, OS, R	~		v v	"	~	~	D	13/(1)	(1)/(1)	NA		S, ST, T	S	\$2,400- \$5,000
ork Systems	NetHopper NH-SYNC+	В	R	2	1	E	2	ı	V, X, O	R				~	~	~		.2/.009	NA	NA			S	\$2,195
262-8023	NetHopper Dial-up Router Products	В	R	1	1	E	5		0	R				~	~	~		.2/.009	NA	NA	E		S	\$1,695- \$4,495
Corp. 58-3550	LanRover	В	В	1	1	E, T	8		х, о	R, O	~			~	V	~	L	(1)/(1)	(1)/(1)	NA	H	ST, T	P, S	\$2,899- \$4,999
	LanRover/Plus	В	В	1	1	E, T	8		X, O	R, O	~			~	~	~	L	(1)/(1)	(1)/(1)	NA	H	ST, T	P, S	\$4,299- \$9,499
	NetModem/E		В	1	1	E	1	F, I, T	X, O	R	~			V	V			(1)/.004	NA	NA	Н		Р	\$1,699
Corp. (805) 294-0555	XANbox/1103e	В	В	1	1	E	3	F, T	S, V, O	R	-			-	-	_		5/.23	NA	NA	E	Т	P, S	\$995- \$1,595
Symplex Communications	Direct Route DR1		B, C, R	1	1	E	6	F, I, T	S, V, X	0	V	~	V	· •	V	~		1.75/(1)	NA	NA	E	Т	P, S	\$1,999
Corp. (313) 995-1555	Direct Route DR2	В		2	3	E, T	8		S, V, X	0	~			<b>'</b>			S	7/(1)	(1)/(1)	NA	E	S, T	P, S	\$6,999
	Direct Route DR5	В	C, E	5	6	E, T	20	F, I, T	S, V, X	0	~	~	V	′ ′	~	~	S	14.8/(1)	(1)/(1)	NA	E	S, T	P, S	\$7,999
3Com Corp. (800) 638-3266	NetBuilder	В	В	1	2	E, T	2		S, V, X	I, OS, R		~	V	' '	~	~	E, S	6/.253	6/.094	NA	E, P	S, ST, T	R, S	\$3,495- \$5,995
	NetBuilder II		B, C, E, R	8	16		24	İ	HS, S, V, X, O	I, OS, R, O				<u>.</u>	ļ.,		A, E, P	14.79/ .812	7/.48	50.96/2 .567	E	S, ST, T		\$7,995- \$40,495
	NetBuilder Remote Office		В	1	1	E	3		S, V	OS, R		~	•	~	~		E, S	3/.073	NA	NA	E, P	T	R, S	\$1,795- \$3,495
Telebit Corp. (800) 835-3248	NetBlazer family		В	1	3	E, T	32		0 1	R	_			~	~	~		(1)/(1)	(1)/(1)	NA	E, H		S	\$2,299- \$10,000
Triticom (612) 937-0772	BRouteIT	S	В	2	2	E	1	1, S, T	S	R				~		_		11.25/ .567	NA	NA		T	S	\$795
Well Fleet Communications,			В	1	2		2		S, V, X, O	i, OS, R, O	1						A, D, E, L, P, S	(1)/(1)	(1)/(1)	NA	Р		P, S	\$2,295- \$4,495
inc. (508) 670-8888	Link Node	В	R	4	16				H, V, X, O	I, OS, R, O	}						L, P, S	5.951/ .811	20.50/ .46	NA	Р		P, S	\$6,750- \$41,750
	Concentrator Node	В	С	13					H, S, V, X, O	I, OS, R, O	<u> </u>						L, P, S	5.951/ .811	20.5/.46		Р	ST, T		\$15,000- \$122,000
	Backbone Concentrator Node	В	E	13					H, S, V, X, O	I, OS, R, O							A, D, E, L, P, S	14.88/ .811	21.5/.48	123.3/ 2.79	P	ST, T		\$24,000- \$397,500
	Backbone Link Node		E	13	16				H, S, V, X, O	I, OS, R, O	1						L, P, S	14.88/ .811	21.5/.48	123.3/ 2.79	Р	ST, T	P, S	\$12,000
Xyplex, Inc. (800) 388-5316	6220 Bridge Router	В	В	1	1	E	2	F, E	S, V, X, O	I, OS, R	-		V	<u> </u>	-	-		8.48/(1)	NA	NA	E, H, P	T	P, S	\$3,295- \$3,795

#### Continued from page 90

challenge."

Novell offers its NetWare Multiprotocol Router Version 2.11, a NetWare Loadable Module that can be installed on an existing server. If traffic needs dictate, such as at the headquarters location, the software can be installed on a dedicated server. Novell did not respond in time to have its product listed in the Buyer's Guide chart.

"Software-only routers maintain the existing hardware investment, provide the flexibility to operate under many topologies and are very scalable," de la Vega says. "Adding another LAN or WAN segment is just a matter of adding another inexpensive network interface card."

David Hall, director of prepress at Conde Nast Publications in New York, found Novell's NetWare Multiprotocol Router to be both flexible and scalable. Conde Nast's network includes Arcnet and Ethernet local segments, plus an AT&T Global Information Solutions WaveLAN wireless LAN interface to another segment in a building across the street.

"Our unique mix of hardware left us with two choices: replace two of the LAN technologies and centralize on the third, or find a software-based router that would work with all of the topologies," Hall says. "Since we had a great deal of experience with NetWare, Novell's solution had multiple benefits."

3Com comes at it from a different angle with the Boundary Routing architecture used in its NetBuilder Remote Office router, says Bob Roman, product-line manager at 3Com. In developing Boundary Routing, 3Com built hardware that can be installed in a simple process that involves connecting power, attaching WAN and LAN cables, inserting a boot disk, and turning on the switch.

Boundary Routing also keeps WAN costs down by using dial-up links, data compression and a unique routing technique. In traditional routing, an internal routing processor makes all routing decisions for incoming data packets. In Boundary Routing, the remote office is connected via a WAN port that supports a form of dial-up IP, such as the Point-to-Point Protocol, to a backbone router that makes all routing decisions.

In essence, the central and remote sites are viewed as a single system. In other words, the central-site router treats the remote office as an

extension of one of its WAN ports. When the routing protocol is IP, both the central port and the remote branch router share the same IP address.

The Boundary Routing strategy greatly reduces the intelligence needed in a branch office router — and, likewise, its cost — because it must make only one decision. It must figure out whether to forward a packet back over the LAN if the destination device is local or over the WAN to the backbone router for a routing decision.

Recent enhancements to the Boundary Routing strategy include frame relay support; bandwidth optimization, such as data compression; packet prioritization and filtering; and redundancy, including dial-up links on demand, bandwidth on demand and dial backup.

#### **REMOTE MANAGEMENT**

When the internetwork cornerstones are distributed around the country or around the globe, a cohesive plan to manage and control these key elements is required. The most popular technique is using the Simple Network Management Protocol, which communicates

management information between a network management console, such as Hewlett-Packard Co.'s OpenView or SunSoft, Inc.'s SunNet Manager, and an agent embedded within the router. The information communicated between the agent and manager, such as interface configurations or routing table entries, is maintained in a database called the Management Information Base (MIB).

One way to measure a vendor's strength in SNMP is by the number of MIBs it supports. For example, most routers support the Internet-standard MIB, known as MIB II. Other MIBs that define specific management details for virtually all LAN and WAN interfaces are available, however. For example, Proteon's DNX router family supports the token-ring, Ethernet, RS-232, PPP, frame relay, bridge and OSPF MIBs, in addition to MIB II.

"Virtually all internetworking products implement SNMP," says Bob Reason, senior product manager at Proteon. "The degree of that implementation, as evidenced by the number of MIBs that a router supports, distinguishes one product over another and makes it more manageable."

Continued on page 94

#### Continued from page 93

To extend SNMP's reach, the IETF developed several variations of the Remote Monitoring (RMON) MIB, including one for Ethernet, as defined by RFC 1271, and one for token ring, as defined by RFC 1513. The RMON architecture places intelligent devices, called probes or RMON agents, at strategic locations within the internetwork. The probe or agent collects statistics regarding the operation of that network segment and reports both current and historical data to the management console.

CrossComm, D-Link Systems, Inc., Madge Networks, Inc., Newbridge, RAD Network Devices, Inc. and 3Com are among the router vendors with RMON agents on their products.

The computing archives are filled with old technologies that have reached the end of their useful lives — from card readers to paper tape punches. While some people worry that routers will be added to that collection in the near future, current sales projections and analyst reports suggest other-

"The need for a router to connect heterogeneous WAN environments to ATM corporate backbones will guarantee routers a role in the migration to ATM in WAN environments," says IDC's DePietro. That conjecture, coupled with the projection of a gradual transition to ATM at the desktop, places the router as a key building block in both present and future internetworks.

→ Miller is a contributing editor and president of DigiNet Corp., a Denver-based data communications engineering firm. He has authored seven books on LAN and WAN technologies, including Analyzing Broadband Networks: Frame Relay, SMDS and ATM and can be reached via the Internet at mark@diginet.com.



#### The Short List:

#### Routers

The Short List highlights products that Network World recommends you examine during the router purchasing process. The product families in The Short List meet the needs of enterprise network users by supporting a scalable architecture; a wide range of routing and transport protocols; a wide

range of LAN and WAN interfaces; consistent and verified performance throughput benchmarks; and support for the Simple Network Management Protocol and the Remote Monitoring (RMON) Management Information Base. Your selection criteria may differ.

#### **■** Cisco Systems, Inc.

#### Cisco router family

Cisco is most impressive in providing products that grow with the enterprise — from the Cisco 2500, which handles one LAN and four WAN ports, to the Cisco 7000, with 30 LAN and a whopping 240 WAN ports. Cisco also has a clear view of the future and is currently shipping its Asynchronous Transfer Mode HyperSwitch, which integrates with the high-end Cisco 7000.

Cisco's router family supports just about everything else, too including a broad range of interfaces, protocols and network management. Frame relay and Switched Multimegabit Data Services WAN links are supported across the board. Cisco also routes all of the major network protocols with strong packet-per-second throughput numbers.

#### **■** CrossComm Corp.

#### **XL** family

The critical feature that CrossComm brings to the table is a topnotch fault-tolerant architecture that supports both IBM Systems Network Architecture and multiprotocol LAN traffic. CrossComm's parallel router architecture provides dual paths between network components and the backbone. Other critical components, such as power supplies and fans, are also redundant and hot-swappable.

The firm is also responsible for some innovations, such as its Protocol Independent Routing, which provides fault-tolerant routing of SNA, Network Basic I/O System and other protocols. Imbedding an

RMON agent into its routers is another CrossComm first.

#### ■ Proteon, Inc.

#### CNX and DNX families

Proteon's routers stretch beyond the firm's traditional strength in providing IBM Token-Ring LAN and SNA products. The router families include broad support for a number of interfaces and protocols, including FDDI, frame relay and ISDN. SNA support includes Data Link Switching (DLSw), NETBIOS filtering and name caching, and Synchronous Data Link Control-to-Logical Link Control 2 conversion.

At the low end, the DNX 350 supports either one Ethernet or one token ring, plus four WAN ports - twice as many WAN ports as most other vendors' branch office routers. At the mid-range and high end, Proteon adds FDDI support, with up to 20 LAN and 20 WAN ports. Proteon is also strong in network management, in general, and token-ring management, in particular.

#### ■3Com Corp.

#### **NetBuilder family**

3Com's multiprocessor architecture gives net managers what they crave — upgradability without obsolescence. The family scales from an entry-level, single processor to a high-end multiprocessor router within the same chassis. Better yet, the multiprocessing architecture removes any concern over forklift upgrades by being compatible with existing NetBuilder II chassis and I/O modules, and sporting a migration path to

3Com is committed to delivering ISDN Primary Rate Interface and ATM Data Exchange Interface later this year, plus ATM User-Network Interface and 100M bit/sec fast Ethernet in the first half of 1995. The NetBuilder Remote Office product implements 3Com's Boundary Routing architecture, which provides a low-cost and easily implemented method of bringing remote offices into the enterprise net.

#### **■** Wellfleet Communications, Inc.

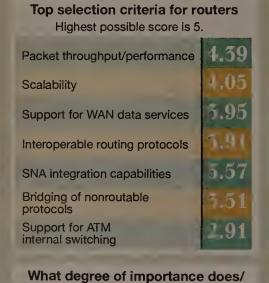
#### Node router family

Wellfleet's symmetric multiprocessor architecture is identified by many analysts as starting the trend toward more scalable, multiprocessor routers. Each interface module is equipped with a dedicated processor that performs all routing functions, including filtering/forwarding, packet processing, routing database updates and SNMP requests.

By merging recently with SynOptics Communications, Inc., Wellfleet is destined to integrate SynOptics' strength in desktop connectivity, switching and network management with its strength in wide-area, multiprotocol routing.

#### Reader views on routers

Based on 100 interviews.



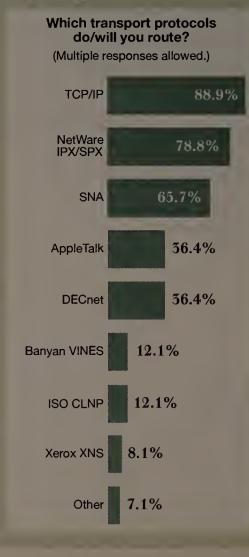


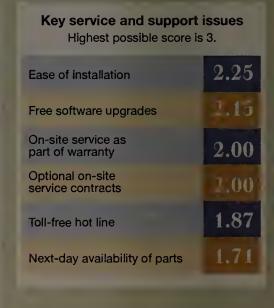
Somewhat important Not at all important

being directly connected to a WAN service? Wide-area connected 72.07%27.95% In what capacity do/will you use wide-area connected routers? To connect remote offices 55.25 For enterprise-level routing

What percentage of the routers

you do/will use are local vs.





Focus Data, Inc., an independent narket research firm in Framingham, Mass., conducted this survey. Focus Data specializes in gathering primary data from end-user organizations regarding their enterprise network environment and needs. For more information on Focus **Data services, call Mona Dabbon** at (508) 626-2556.

GRAPHIC BY SUSAN SLATER

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the language they

Voice response lets customers help themselves.

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#### Review

# SunNet Manager gets the job done

anaging a complex, multisegment network is seldom an easy task.

With new nodes sprouting at every turn, faulty routers, failing Ethernet cards and improperly terminated segments can have adverse effects on parts of the network without affecting others. Poor node and traffic distribution can cause intermittent problems and wreak havoc on performance. An unclear and inaccurate network map can render capacity planning meaningless.

With these problems in mind, we took a look at SunNet Manager Version 2.2—the latest net management release from SunSoft, Inc., a subsidiary of Sun Microsystems, Inc. This \$4,995 software-only system is designed to give you the ability to graphically map, monitor and manage small and midsize heterogeneous networks from a single Unix workstation.

Although we encountered a few minor postinstallation problems and suffered through a bout with some out-of-date documentation, our experiences with SunNet Manager were mostly positive. We found that it contains enough built-in features to perform simple monitoring tasks in a relatively short time span.

NETWORK VYORLD TEST alliance

However, as a stand-alone product, it should not be considered an enterprisewide network management solution because it lacks a robust set of tools to control the wide variety of third-party peripherals on most local- and widearea networks.

To actively manage these devices, you have to turn to any number of products offered via the SunNet Manager Technology Partners program. Currently, there are more than 60 add-ons available, including offerings from leading network vendors such as Cisco Systems, Inc., SynOptics Communications, Inc. and Wellfleet Communications, Inc. In terms of sheer numbers, SunNet Manager has amassed the greatest amount of third-party support, but its two closest competitors — IBM's NetView/6000 and Hewlett-Packard Co.'s OpenView — are not far behind.

It's worth noting that some of these SunNet Manager add-ons are tightly integrated into SunNet Manager, while others simply use it as a front end to launch their own applications. Incidentally, like most commercial software, these addons are not free of charge, but rather range in price from several hundred to several thousand dollars.

In addition to the third-party offerings, Sun-Soft promises that SunNet Manager Version 2.2 will be fully compatible with its next generation, object-oriented network management system, code-named Encompass. Among its many bene-

Although its configuration process is ungainly and its documentation is a bit aged, SunNet Manager 2.2 provides a watchful eye on net performance.

fits, Encompass promises tighter integration with other vendors' Simple Network Management Protocol management applications and the ability to monitor the network from any workstation.

#### **GETTING STARTED**

SunNet Manager 2.2 is designed so it can be installed in about 15 to 20 minutes. It will operate on any Unix workstation with a scalable processor architecture (SPARC) or Intel Corp. 80X86 chip running Solaris 2.2 or greater, with 32M bytes of memory. A fairly large disk partition and a color monitor are also recommended. In June, SunSoft released Version 2.2.1 of SunNet Manager, which brought the equivalent features of Version 2.2 to Unix workstations running Solaris 1 (SunOS 4.3.1).

Like most Sun products, the software is provided on CD-ROM and is contained in four packages — the Answerbook (on-line documentation), Agents & Libraries, Core tools and SNMP daemon. Each package is installed using a utility called pkgadd. All in all, plan on allocating around 35M bytes of disk space for the software. This will quickly double or even triple when raw data files, reports and additional software are thrown into the mix.

We installed all four packages on our management console, a SPARCstation LX, and then installed agent software on a subset of the other network workstations. Depending on your network management needs, it may not be impera-

By TODD COOPEE

tive to install agents on remote workstations. By default, most network objects support protocols that enable SunNet Manager to obtain useful data without the presence of agents. Installing agents on individual machines will, however, provide greater and more detailed information.

The entire installation ran without a hitch; it was the postinstallation procedures that caused us some problems.

An addendum to the installation guide indicated that two mandatory patches (10989, 10999) needed to be applied to SunNet Manager in order to fix several bugs that may occur when running under Solaris 2.2. Since our management station was running Solaris 2.3, we decided against installing the patches. A quick call to SunSoft's technical support confirmed that the patches would not have installed properly under Solaris 2.3 anyway because they were designed to overcome bugs in Solaris

To be on the safe side, we downloaded a text file containing the entire list of patches for Solaris 2.3 from Sun's commercial ftp site, sunsolve1.sun.com. We checked the entire list for SunNet Manager packages and discovered that a patch (101697) did indeed exist that was not referenced in any of the documentation. Another call to technical support revealed that SunSoft considered this a mandatory patch. For a software package of this caliber, we expect that SunSoft could at least keep the documentation

#### **MAP MAKING**

up-to-date.

Once installed, the first thing Sun-Net Manager does is create a network map and management database. To help you in this task, a Quick Start window appears at initial start-up. It offers Continued on page 98



#### **Product:**

SunNet Manager 2.2

#### **Key findings:**

- Built-in features can be augmented with more than 60 third-party add-ons.
- ► Network maps are customizable.
- ▶ Documentation is a bit antiquated, as is the on-line distribution service.
- Anonymous FTP site and mailing list provide useful information.

#### Price:

\$4,995; upgrades are \$1,998.

#### **Platforms:**

SPARC and Intel X86 workstations

#### **Requirements:**

- ► Solaris 1.X or 2.X
- ▶ 32M bytes of RAM
- Large disk partition (400M bytes recommended)
- ► Color monitor recommended

#### Vendor:

Sun Microsystems, Inc. 550 Garcia Ave. Mountain View, Calif. 94043 (800) 786-0404 Continued from page 97

two options - HeadStart and BasicStart. Selecting HeadStart launches the console application and calls the built-in Discover tool that finds and displays up to five nodes in the local subnet. Since the process occurs quickly, employing HeadStart is a perfect choice if you want to get comfortable with the basics of Sun-Net Manager before trying to map out your entire network.

ager places them in a separate map and allows you to move them to any other available map. You can either run the Monitor tool manually or configure it to run on a weekly basis at a specific day and time.

The Discover tool is also fully configurable. You can set the depth and breadth of network searches and limit the scope of discovered objects. For our tests, we configured Discover to find all of the objects in two particular sub-

Requisit Action: \_ .... Request Lame: IEM\_REQUEST (shint conti-. Lent Schemar App y | | |

SunNet Manager lets you define data requests to query net objects; it also supports event requests to monitor conditions based on predefined thresholds.

For those looking to be a little more daring, selecting BasicStart starts SunNet Manager with an empty database and lets you configure the Discover tool and initiate full-scale network searches for entities on the network, including bridges, routers and workstations.

Besides adding devices to the management database, the Discover tool also builds a graphical representation of the network using a built-in library of icons. In general, Discover maps the network in a very Internet Protocolcentric fashion, hierarchically populating domains, subnets and local segments with IP and SNMP-addressable devices reachable from the console machine. Discover finds network objects either by pinging them if they are SNMP-based or by using the Internet Control Message Protocol if they are non-SNMP

Once a baseline database and map has been created, a Monitor function is also available within the Discover tool to assist you in detecting new elements that appear on the network and are not yet part of the run-time database. When new elements are found, SunNet Man-

🚆 did it

We installed and tested SunNet Manager on a **SPARCstation LX running** Soiaris 2.3. The workstation was equipped with 32M bytes of memory and a 1G-byte disk drive. The network used for testing purposes consisted of over 800 nodes.

nets, find all of the routers in the entire domain and then map all of the objects in the entire domain.

For the most part, our network searches were bountiful. The Discover tool had no trouble finding all the nodes in the subnets we had it search through. In terms of performance, the response rate of our management console, a SPARCstation LX, was adequate, although we realized that a workstation with a faster processor and additional memory would have cut down on search time and sped up screen

Even though SunNet Manager always found the correct number of elements in our searches, it misrepresented many of the network objects. More often than not, third-party workstations, minicomputers and routers were represented with a generic icon. SunNet Manager also did not have many of the newer Sun workstations, including the SPARC station 5 and SPARCclassic, in its list of known objects.

At one point, SunNet Manager indicated that several of our routers were workstations and that one or two of our workstations were

We ran the tests again, with the results being the same each time. This can range from a minor inconvenience to a major annoyance since you will have to manually change the icon of an object to reflect its proper identity. As you can guess, making wholescale changes of this type can add significant time to the mapmaking process.

Fortunately, SunNet Manager provides several options to enhance the readability and accuracy of network maps. You can augment the list of known objects by creating new records in the local schema file and creating new icons using an icon editing utility. To promote multiple, distinct views of the same network objects, you can also cut and paste elements between view hierarchies, modify an icon's font and color, and apply background graphics to maps.

Nonetheless, expect to devote a large slice of time to cleaning up network maps and creating different network views.

#### **NETWORK INTELLIGENCE**

Once our network maps were created and fine-tuned to our satisfaction, we began to consider how we wanted to manage network objects and what kinds of usage data we were looking for. SunNet Manager provides two primary management functions: collecting statistics, such as resource utilization, for later analysis and capacity planning; and proactive monitoring of problems that may occur on network, such as an unavailable host or overloaded router.

To establish continuous monitoring of a map object or agent in SunNet Manager, you simply select it with the mouse and indicate whether a data request or event request should be generated. Data requests allow you to query network objects for data values over a period of time. When created, the data request specifies what information should be collected, at what frequency and for how long. For example, a data request could be created to track CPU usage hourly for a critical file server over a 60day period.

You can also tailor data requests to save the incoming data to a log file for later analysis or even display the attribute in a small real-time bar graph next to the object being monitored. This second option is an effective technique to retain an overall view of network usage when

multiple data requests are active.

complement data To events, event requests allow you to monitor fluctuations in a network object's data values based on a predefined thresh-

Event requests are quite similar to data events: A variable must be chosen, a threshold defined and an action selected to be taken if and when the threshold is exceeded. These actions include the ability to change the appearance of the object's

icon, create an audible beep on the SunNet Manager console, play audio files, pass the information to a shell script and send electronic mail to one or more users. For example, an event request could be created for the same file server that also has a shell script displaying the processes consuming the most CPU cycles when CPU utilization reaches 85%.

SunNet Manager comes equipped with several predefined requests included in the software. Similar to macros in a word processing package, SunNet Manager's built-in requests gather useful information without requiring you to get bogged down in syntax and semantics. The predefined requests also make great templates for the creation new information

With our network maps firmly in hand, we quickly fired off several predefined data requests and had SunNet Manager monitoring CPU utilization on several workstations, pinging other workstations for availability and keeping track of disk space utilization on several of our mission-critical file servers.

We also set up several event requests to alert

#### **Basking in the Sun**

The next release of SunNet Manager, dubbed Encompass, will allow network management functions to be initiated from any node in the network.

More than 60 third-party applications run on SunNet Manager.

Sun has shipped more than 15,000 copies of SunNet Manager.

us when disk space on one machine dropped below a certain threshold and when collisions on one of the routers exceeded normal values. Each time the threshold was passed, SunNet Manager notified us of the potential problem by highlighting the individual icon in the network map.

Since keeping track of individual requests can quickly become unruly, SunNet Manager provides a Requests Viewer. This built-in tool is accessible from the menu bar and allows you to view, select and modify individual requests. Requests may also be sorted by a number of variables, including object name, state and type. We used to Requests Viewer to cancel several data requests and to modify the threshold values of a few of our alert requests.

#### **DATA ANALYSIS**

SunNet Manager

primary manage-

ment functions:

statistics for later

capacity planning,

problems that may

provides two

collecting

analysis and

and proactive

monitoring of

occur on the

network.

Once data has been gathered by SunNet Manager, it can be viewed by using one of two tools. The Browser Tool provides a nongraphical representation of all the raw results collected by the system. By default, SunNet Manager organizes the data by system, agent,

group, request type and date. You also have the option of directing the Browser Tool to export data to the Grapher Tool.

Similar to a spreadsheet, the Grapher Tool takes raw data and displays it in two- or threedimensional graphs. In this format, statistical trends are easily identifiable. Multiple graphs can be displayed side by side for easy comparison across network objects. Besides using data from log files, graphs can also be created depicting data received in real time.

The Grapher Tool is extremely flexible. Data can be displayed using absolute or relative rendering, and many attributes, such as color and size, can be configured. The Snapshot utility in Solaris can also be used to take screen shots of graphs for archiving, reporting and printing purposes.

#### **DOCUMENTATION AND SUPPORT**

SunNet Manager's documentation strikes an adequate balance of information for both novice and seasoned network managers, although it is a bit sketchy in some places. While it makes learning the product a snap, it clearly should be updated in parts to reflect the latest release of the Solaris operating system. Both the user's guide and reference manual are available in AnswerBook format, Sun's form of on-line documentation, which is a great

Sun provides telephone support for SunNet Manager users as well as an E-mail distribution service. We called technical support a few times during the product's installation for assistance and received satisfactory responses

See SunNet Manager, page 104



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6

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#### CIX tricks

As I was reading your July 25 issue, I had to pause and consider your article titled "Internet users to pay if IP resellers don't" (Page 1). This article discussed the secret vote by the CIX board, in which five members decided to mpose a \$10,000 membership fee. Now I am ind of new to the world of the Internet, but I el this is extortion by a cartel that seems raguely similar to the one in Columbia.

The Internet was begun as a loosely conrolled network of colleges, research firms and overnment installations that used the connecivity to share ideas and other information. Since Al Gore has begun pumping the public about the Information Superhighway, everyone seems to want to jump on the bandwagon and make money. Now the CIX is quoted as being a cooperative of 60 IP providers; will hey have to pay the fee? Where do these characters get off saying that resellers have to join their co-op? Last time I checked, there was no union on the Internet, was there?

One of the stipulations of the grant allowing my organization to get on the Internet was that we had to provide Internet access to other schools in our district, and we have discussed selling connections to other schools for a nomnal monthly fee. This would not only help our strained budget, but it would allow the schools hat could not normally afford connections access to the resources of the Internet. Isn't that why it was created in the first place?

Andrew Downie Palatine, Ill.

#### New law

My complements to Scott Bradner on his column "Will someone please buy them a clue?" (Aug. 22, page 16). It gets plenty of chuckles around the coffee machine, as well as calmly explaining the CIX position.

Further, may I (at the risk of exposing ignorance of prior practice) propose Bradner's Law of Cascading Stupidity: "Someone makes a dumb statement, and a bunch of people try to prove they are dumber than the original poster."

> Steven Spicer Principal software engineer Fasfax Corp. Nashua, N.H.

#### ATM option

Your article "ATM pricing emerges — hold onto your wallets" (July 18, page 1) seriously calls into question a lot of the media frenzy around wide-area Asynchronous Transfer Mode. While ATM is certainly a technology to get excited about, your article outlining the pricing structure for ATM shows that broadband ATM is not affordable today for most users, and may not be tomorrow.

However, ATM technology, as opposed to wide-area ATM services, is actually affordable and available today on low-speed, affordable leased lines through cell relay-based products.

The strongest attraction of ATM — its ability to run voice, fax, video and data over WANs - is due to the nature of its cell technology. It's these broadband ATM cells - 53 bytes (424 bits) - that provide the dynamic bandwidth allocation advantage over other networking technologies. But the broadband ATM-size cell doesn't make a good match for a microbandsized line of 9.6K, 14.4K, 56K or 64K bit/sec speeds.

However, through new technology, cell relay is available for applications using the most popular and affordable leased lines. Micom calls this technology "microband ATM." Through specialized hardware and firmware, cell relay cell sizes have been brought down dramatically, to 25 bits on 9.6K bit/sec applications and to 50 bits on 256K bit/sec. Thus, the same advantages that cell relay has on high-speed applications now exist in low-speed applications.

Cell relay-based microband ATM allocates bandwidth to active users, only for their moment of activity and only in their direction of activity. Since users actively transmit or receive data only 5% to 10% of the time, and voice conversations are active only 40% of the time, cell relay technology achieves five to 10 times the efficiency of conventional multiplexing techniques.

Network managers at small to midsize companies, or large firms with remote offices, don't have to wait for ATM services to come down in price; they may never fall far enough to be affordable for branch office applications. Those shopping for WAN technology or services need to follow the old axiom, "Check the sticker price." You'll be surprised what you can, and cannot, afford.

> Ken Guy Vice president, corporate strategy Micom Communications Corp. Simi Valley, Calif.

#### Not a degree

Gibbs refers to a "Certified Net Ware Engineering degree." As a CNE I am more than a little concerned by the equating of a CNE with a degree, even in a humorous article.

cate stating that the holder has successfully passed a series of seven examinations dealing with Novell, Inc. NetWare topics.

degree requires that the holder successfully complete the equivalent of two years of fulltime study, and I know of no engineering degree program that requires less than four years of full-time study.

In some states CNEs may not refer to themselves as engineers, because that title is conferred only by a professional engineers society. CNEs, while having displayed a level of expertise with NetWare networks, have no more claim to the title of engineer than a garbage collector does to the title sanitation engineer. The CNE program is not a replacement for a degree program and should not be promoted as such.

> Gregory Kirk Personal computer specialist Redlands Community Hospital Redlands, Calif.

Editor's response: The word "degree" was inadvertently introduced during the editing process. Network World regrets the error.

#### Not just hype

Your test piece on ATM switches (Aug. 22, page 43) was very good. I am happy to see you are testing these switches so that people can appreciate that performance claims are true and not just a lot of hype.

> Beverlee Hanley Senior product-line representative TRW High Performance Networks Torrance, Calif.

In his column in your Aug. 22 issue, Mark

A CNE is not a degree; it is simply a certifi-

By comparison, even an associate of arts

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# Help desk

Continued from page 2

Ron Jeffries, principal of Jeffries Research, an ATM consulting firm in Santa Maria, Calif., and editor of the "ATM User" newslet-

To learn about ATM, a good starting point is the video, "Getting Started with ATM." It pro-

vides a simple, easy-to-understand overview of ATM technology and applications, and has several helpful animation sequences. However, it contains enough serious "talking

heads" lecturing with solid technical content that there's little danger you'll confuse this video with Schwarzenegger's latest film, True Lies. The video costs \$84.95 plus \$5 for shipping and handling, and comes with a 30-day money-back guarantee.

For more information on ordering the video, call Access Media at (800) 886-8936, Ext. 50. Users may also want to check with their ATM vendors, many of whom offer the tape free of charge.

Organizations may also be interested in the ATM Forum's ATM 101 presentation. For more information, contact the ATM Forum using

their FaxBack service, by calling (415) 688-4318 from the handset of your fax. You can also contact the ATM Forum on the Internet using the Mosaic home page, http://www.atmforum.com.

Our company has just installed a gateway for access to the Internet. Very few of our administrators or staff know or understand the power of the internet. To keep up with the questions and problems that have arisen, we would like to know if you can provide a list of books on using the Internet.

Curtis Conaway, Overland Park, Kan.

Adam Gaffin, senior writer at NW, replies: You may want to check out Kevin Savetz's "Unofficial Internet Book List," a comprehensive catalog of books about the Internet. The list includes not only basics such as price and publisher but summaries for each book. Savetz posts the list on the fifth and 19th of every month in several Usenet news groups on the Internet, including alt.internet.services misc.books.technical and news.answers. It is available via anonymous FTP at rftm.mit.edu in the /pub/usenet-by-groups/alt.internet.services directory. Or to obtain a copy via E-mail, send a message to mail-server@rtfm.mit.edu. Leave the subject line blank, and as the message, write: Send usenet/news.answers/internet-services/internet-books.

Can you provide contact information for the Network Startup Resource Center (NSRC), an organization that provides technical assistance to people setting up networks in developing areas, which was mentioned in NW's July 11 issue on page 49? I want to get some Information on setting up networks in China.

Amy Zhang, San Mateo, Calif.

Network World contacted Randy Bush, founder of the NSRC. He said the best way to contact his organization is to send E-mail to lowcost-net@psg.com. You can also request information via fax at (503) 297-9078. Telephone calls are not accepted.

# SunNet Mgr.

Continued from page 98

to our questions.

Overall, the technical support staff seemed

empathetic and eager to help.

According to SunSoft, the E-mail distribution service houses some documentation and software from various sources, including vendors and authors of shareware that can be used with SunNet Manager. You access the service by sending E-mail with various commands in the body of the mail message to snmserver@sun.com.

We received an index of all of the various information and software available at the site and were disappointed to find that nothing had been updated since December 1993. Even though the information looks old, some of it is still useful to the novice SunNet Manager user.

Fortunately for users, a more current infor mation archive is available, independently from Sun, via anonymous ftp at zippy.telcom.arizona.edu. This site contains patch information, as well as additional software, icons and documentation.

The University of Arizona also maintains a mailing list, dubbed snm-people, devoted entirely to SunNet Manager users. We signed up for this list and found it to be very active and

Although SunNet Manager requires a fair ount of configuration time, sports aging documentation and needs some thirdparty packages to make it approach an enterprise management platform, we still believe that it is a valuable tool. Its customizable mapping functions, built-in monitoring and polling features, and reporting capabilities make it a good choice for sites looking to keep a watchful eye on network performance and reliability.

Coopee is the assistant director of technical services at Trinity College in Hartford, Conn. He can be reached via E-mail at todd.coopee@trincoll.edu.

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# The Information Superhighway. You've heard the hype. Now hear the facts.

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works" in front of audiences across the country. It's been covered extensively in the trade, business, and general press. It's been the subject of intense lobbying efforts and public relations campaigns.

Commencing this year, long-term, multi-billion dollar investments in the infrastructure will be made by the telephone and cable companies, as well as equipment manufacturers. In addition, Congress is entertaining the most sweeping set of changes in the communications laws to hit the industry in decades.

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- Stewart Alsop, Editor in Chief, InfoWorld; Andrew
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- Where are the best early business opportunities that will result from the Information Superhighway and its applications?
- How can the Internet be tapped for business or commercial use? What are examples of profitable ventures?
- Will different groups really get access, so that the network is truly universal open and affordable to all?
- Who will pay for the Information Superhighway? What about traffic fees for usage?
- What lessons are being learned from the California Research and Education Network (CALREN) and the gigabit testbeds?

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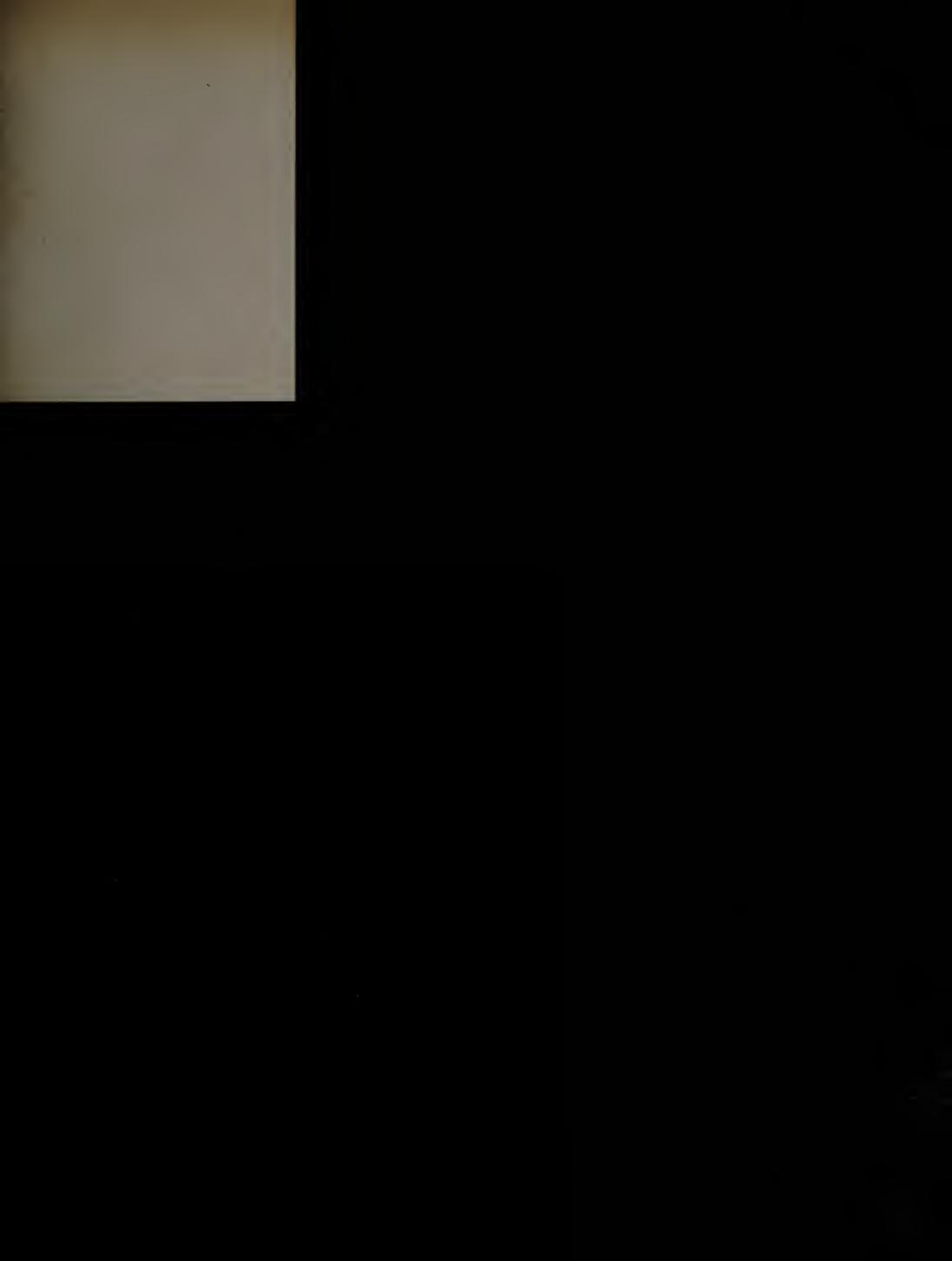
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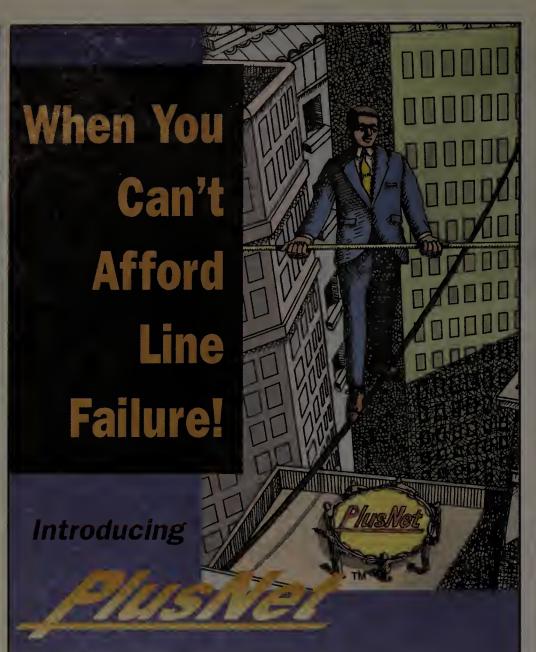
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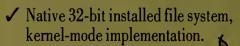
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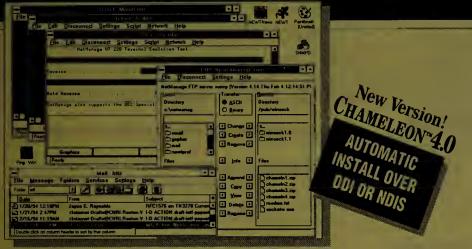
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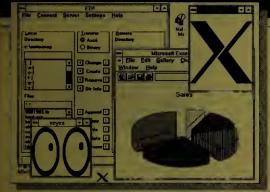
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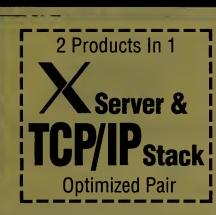
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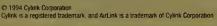
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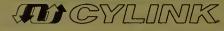
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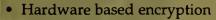
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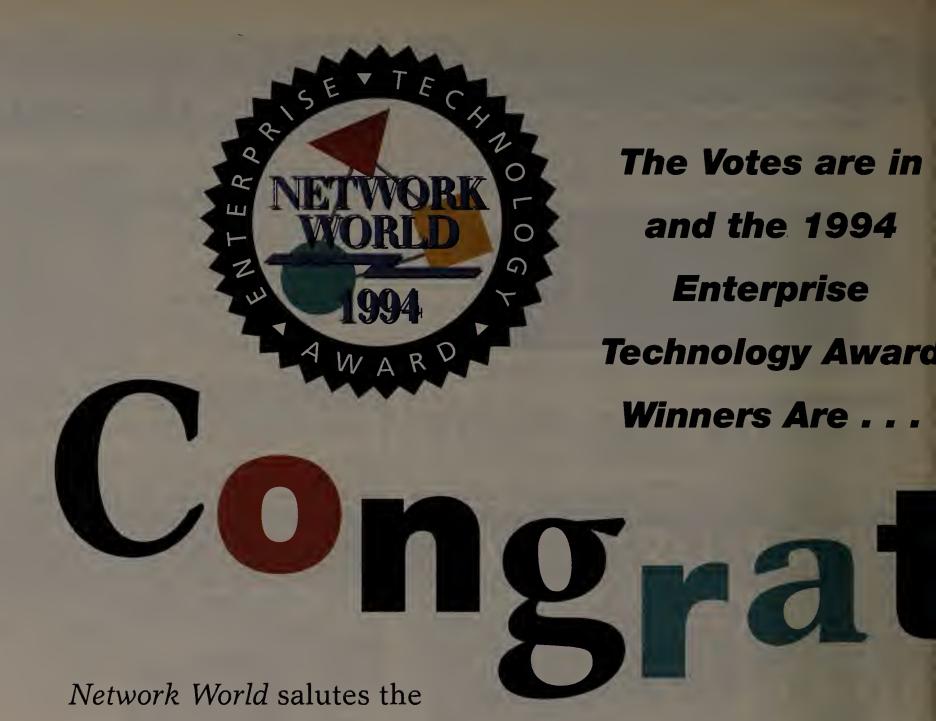
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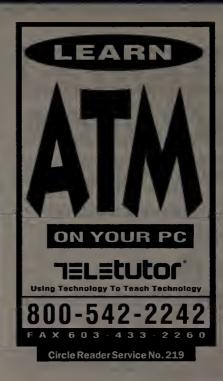
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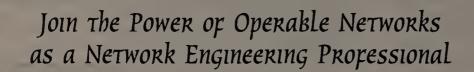








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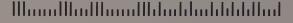
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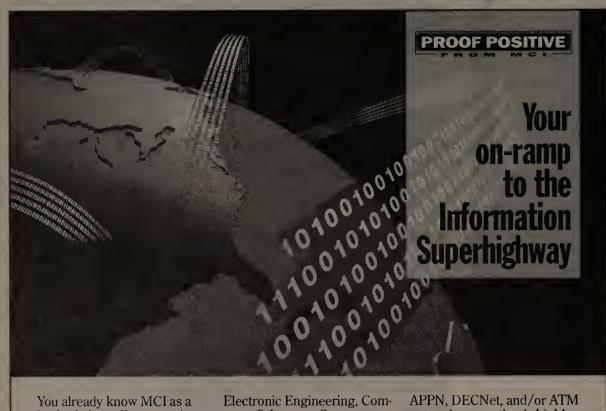
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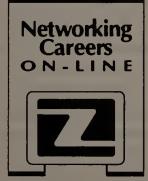
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## Microsoft

Continued from page 1

build an object repository that will let users share objects among frontend development tools.

In many ways, Microsoft is like the IBM of old, spelling out the rules by which users and vendors will play the networking game. To its disadvantage, IBM couldn't carry that power into the client/server world.

But as IBM's influence fades, Microsoft is showing greater

strength in establishing its specifications. It has sprinted ahead of plodding standards

groups, as well as trade consortia, and used its market share to push its specifications so far into the market that even its biggest rivals have to play along.

This three-part Reader Advocacy Force article will examine Microsoft's growing influence as a standards setter, the impact on users and what Microsoft's power means for other vendors. The series is based on wide-ranging interviews and a survey of 200 Network World readers.

Across the industry, there is little debate on Microsoft's standards-setting power. "Microsoft does have the power to specify standards on the desktop because Microsoft owns the desktop," said Ronni Marshak, analyst at Patricia Seybold Group, Inc. in Cambridge, Mass.

That's only natural, agreed Thomas Nolle, president of Voorhees, N.J.-based consulting company CIMI Corp. "Anything that Microsoft elects to support in Windows becomes automatically accessible on about 20 million desktops," he said. "Any [application program interface that has an installed base of 20 million attracts third-party developers to support it."

Con Pro 66 Sure, **66** The benefits of this seeming Microsoft tyranny outweigh is big, but...you the drawbacks. can't ignore the You've got a other standards dictatorship, but that are out it's efficient." there. ?? Thomas Nolle Kurt Haldeman

and ODBC give it huge market compliant applications. power, Microsoft uses its APIs mainly to enhance its operating systems, said John Rymer, an analyst at Patricia Seybold Group.

'OLE, ODBC, all the other APIs that Microsoft comes up with are there strictly to make the Windows environment more stable, more usable to developers," Rymer said. "It's a matter of building on the incredible domination they have."

Most analysts also agree that

Microsoft has gained a major competitive advantage because its APIs are tailored to Microsoft products. Microsoft gains by being an early adopter of its own specifications.

As developers of OLE, Microsoft has the best level of application integration. Lotus [Development Corp.], on the other hand, dragged its feet on Windows, and paid the price by being two generations behind Excel," said Bobby Cameron, senior analyst at Forrester Research, Inc. in Cambridge, Mass.

Microsoft has taken different

approaches to establishing control over key interoperability standards.

In some cases, the company started out as a member of a standards group and then took charge. Case in point: ODBC. ODBC's roots are in work begun by the SQL Access Group (SAG), a consortium of vendors of which Microsoft is a member. The group set out to develop a call level interface (CLI) for accessing SQL databases, but Microsoft, convinced the process was taking too long, decided to establish its own database access protocol.

"We decided to work independent of the group because things were moving slowly," said Dennis Comfort, group program manager for data access and retrieval technologies at Microsoft. "We felt it was better to get something in the works and shipping. Since the release of ODBC, we've been working to converge ODBC with the CLI.

"Microsoft took on the task of driving the standard, but it wasn't done in a vacuum. I view Microsoft as a catalyst to making sure it happened," Comfort said.

Richard Holcomb, vice president of corporate development at Intersolv, Inc., which markets more than 30 ODBC drivers, said Microsoft did the user community a service by tak-

> ing charge of ODBC. "If Microsoft hadn't done it, we'd still be waiting for a standard," he said.

Since the release of ODBC, however, SAG CLI has virtually disappeared, according to Rymer. While acceptance of SAG CLI was proceeding slowly, Microsoft and its partners were able

Although standards such as OLE to swamp the market with ODBC-

The dominance of ODBC doesn't limit the choices users and ISVs can make in developing applications, Rymer said. Developers can use database-specific APIs to access data, or can go the shallower, more generic route of using ODBC. "There's a choice about whether you go generic or product-specific, which gives users a range of options in terms of performance and functionality, and that's what they want," Rymer said.

Vendors have found that it can be bad for business to offer a standard that competes with Microsoft's Borland International, Inc.'s integrated database application programming interface (IDAPI), despite its billing as an alternative to ODBC, gained little acceptance. Later, the company conceded victory to Microsoft by announcing it would develop software that lets IDAPI drivers work through ODBC.

OLE, on the other hand, began as a multivendor collaboration between Microsoft and such partners as Aldus Corp., Micrografx, Inc. and Lotus. In late 1989, Microsoft began talking to other vendors about ways to extend Dynamic Data Exchange — a Windows feature that lets users copy information between applica-

The company took the lead in object-based interconnectivity at a Microsoft-hosted gathering in December 1990 at which it described OLE and proposed that it become the mechanism for application integration. Two years later, OLE 1.0 was made available in Windows 3.1.

#### THE MICROSOFT VIEW

Microsoft said it tries to keep the development of ODBC, OLE and MAPI as open as possible by holding developer conferences, providing specs early on to other software developers, soliciting feedback from developers on Compu-Serve and heavily beta-testing new versions.

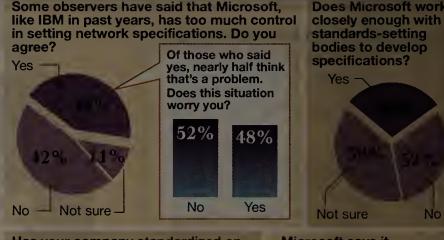
But even Microsoft acknowledges the process of rolling out standards isn't democratic: Microsoft has the final say on what goes in. "We are clearly in the control seat when we're developing these APIs, but we want input from ISVs" said Doug Henrich, director of Microsoft's Developer Relations Group.

Henrich said Microsoft gets ISVs including direct competitors involved early in the process of developing new APIs and has made major changes based on their input. Criticism from Lotus, for example, pushed Microsoft to change the Common Mail Call protocol in the first version of MAPI so Lotus could build links between Microsoft Mail and cc: Mail, he said.

"They're open to vendors who can help them. If you're some small software company, they won't pay attention to you, but what large corporation would?" said Intersolv's Holcomb. "Still, I've never seen any evil empire actions from Microsoft."

"Standards should be set in the marketplace and accredited as they're proven. That's been our approach," said Dave Seres, group product manager for OLE at Microsoft. "We know that standards don't

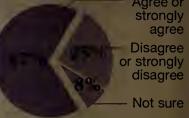
#### Mixed views on Microsoft 'standards'





Microsoft says it sometimes has to set its own standards, rather than wait for standards bodies, in order to serve customers better. Do you agree?

Does Microsoft work



Based on 200 respondents. MAPI = Messaging Application Program Interface OLE = Object Linking and Embedding ODBC = Open Database Connectivity

Focus Data, Inc., an independent market research firm in Framingham, Mass., conducted this survey. Focus Data specializes in gathering primary data from end-user organizations regarding their enterprise network environment and needs. For more information on Focus Data services, call Mona Dabbon at (508) 626-2556.

succeed unless they have widespread support from vendors."

But while vendors may have some say, users are concerned that Microsoft isn't working closely enough with other organizations that are developing the standards used in their multivendor networks. Some 42% of the readers surveyed by Network World said Microsoft has too much control in setting network specifications, and only 29% believe Microsoft works closely enough with standards organizations.

"Sure, Microsoft is big, but you can't ignore the other standards that are out there," said Kurt Haldeman, senior systems analyst for US WEST, Inc. in Englewood, Colo. "[Microsoft] is not following any other standards groups. You've got international groups out there that US WEST has to comply with, and if you're not mapping to their standards, forget it."

Perhaps a bigger concern is that Microsoft's standards are limited to the Windows environment — a concern voiced by nearly two-thirds of survey respondents. Users worry about having to implement one set of standards for Windows and another set for the rest of the enterprise.

'One of the biggest problems we have is with TCP/IP; Windows supports it, but it doesn't really like to," Haldeman said. "If you're going to do anything client/server, you want to go to any Unix box or Macintosh and work with them. The only way to get out there is to use something like TCP/IP. And Windows makes it harder for you to do that.'

Microsoft is still too Windowscentric in its products, raising a wall between Windows and all other operating systems, said Bob Halloran, network engineer, of AT&T Universal Card Services in Jacksonville Fla. That just makes life more diffi cult for information systems depart ments that have to support multiplatform networks.

Microsoft said there is nothing in the architecture of ODBC or OLE that limits them to Windows, and it plans to port both to other platforms.

"The only thing that makes ODBC Windows-centric are Dynamic Link Libraries. There's no reason you can't put that on another platform, and we will soon," Comfort said. An ODBC development kit for Apple Computer, Inc.'s Macintosh is reportedly due soon.

OLE is already available for Macintosh and Microsoft's goal is to develop a common object model that runs on a number of platforms, Seres added.

But another thing that troubles users is that Microsoft's standards, while often first out of the gate, are not always up to snuff. ODBC was initially used almost exclusively for decision-support applications because it proved too slow for on-line transaction processing.

OLE has been criticized by users and analysts as a bandwidth hog when employed across the network.

Ŝee Microsoft, page 130

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## Microsoft

Continued from page 128

Microsoft has said future versions of OLE will function better in distributed environments, but current versions automatically download whole applications across the network to launch embedded objects.

While Microsoft's power to set standards may seem threatening and anticompetitive, some contend that it also pushes the whole computer market to develop more quickly than it would otherwise.

"The benefits of this seeming tyranny outweigh the drawbacks," Nolle said. "When somebody establishes a proprietary API, they're not bound by the petty politics and proceduralism of the standards process. They can make something happen; there are no delays while a consensus is hammered out. You've got a dictatorship, but it's efficient."

An efficient tyranny led to the development of IBM's Systems Network Architecture in 1974. Compare what it has provided users over the last 20 years with the ISO's vaunted Open Systems Interconnection technology, which was launched in 1976 but was slow to develop and gained little ground in the market.

A vendor with a large financial stake in a technology will work hard to develop it and get it into wide use, both by users and by ISVs, Nolle said. By comparison, vendor consortia and standards bodies can be hamstrung by politics and produce least common denominator specs that aren't as robust.

Some users applaud Microsoft's muscle in the standards-setting process, agreeing that is better to have a Microsoft standard today than wait three to five years for something sanctioned by a standards body.

"If there's a de facto standard that works, I couldn't care less whether it comes from Microsoft," said Frank Greene, a systems integrator in Knoxville, Tenn., who uses an Oracle Corp. ODBC driver to connect Microsoft Access to Oracle databases.

Frank Caratozzolo, senior information specialist at Johnson & Johnson in Raritan, N.J., also prefers a working proprietary API now to one developed by a trade group in the future.

US WEST's Haldeman concedes that it may be alright for Microsoft to break new ground

# Cheyenne

Continued from page 12

access time of milliseconds," he added.

The initial release of Cheyenne HSM will run on NetWare 3.1X and 4.X, but a Unix version is scheduled to ship within six months, Cheyenne's Klein said. Cheyenne HSM does not require a dedicated server, but rather but supports multiple servers and all NetWare clients, including DOS, OS/2, Windows, Macintosh and Unix.

Unlike some other HSM systems, Cheyenne HSM supports any file or application server as part of the hierarchy. Or, each layer of the hierarchy can be managed by a different

Cheyenne HSM will ship in the fourth quarter for \$6,995 for the base package. A oneserver expansion module costs \$495, and a four-server expansion module costs \$1,495.

Cheyenne is also considering bundling deals with optical disc and tape-drive vendors, Klein said.

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with its standards. But once an independent standard is established, Microsoft should work harder to make its APIs compatible.

Today, Microsoft is a member of most of the industry's standards-setting bodies but does little to push the development of multivendor standards unless they are based on, or can coexist with, existing Microsoft technology, said Michael Goulde, an analyst at the Patricia Seybold Group.

Last month, for example, rather than change OLE to be more compatible with the Object Management Group's (OMG) Common Object Request Broker Architecture

(CORBA) specification, Microsoft teamed with Digital Equipment Corp. and Candle Corp. in a proposal to an OMG technical committee for server-based software that would essentially translate OLE object requests into CORBA requests, and vice versa.

Microsoft maintains that its standards-creating activity moves the market forward technologically and does not lock users into Microsoft products.

'OLE is a good example of that," Henrich

said. "Everybody agrees there's some value to it. The whole idea behind it is to bring in non-Microsoft applications, just as 1-2-3 can work with Excel.

"It's easy to paint Microsoft as a monolithic company, but unless we continue to build better, more manageable products, our place is not guaranteed in [large user] accounts."

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## Wellfleet

Continued from page 4

reassembly.

In addition, the ATM Link Module will not need an external data service unit/channel service unit (DSU/CSU) because it supports the ATM Data Exchange Interface (DXI). Currently, Wellfleet offers a DXI software interface on its routers that allows them to connect LAN internetworks to ATM nets through an external DSU/CSU.

The ATM Link Module will be available in

the first quarter of 1995. The module costs \$19,000 for a 100M bit/sec TAXI interface, \$20,000 for a 155M bit/sec multimode fiber SONET interface and \$23,000 for a version that supports 155M bit/sec speeds over a singlemode fiber SONET link.

Analysts think the module is a little pricey to spur widespread demand.

At \$20,000, that's about the cost of one of the low-end 16-port workgroup switches,' said Nick Lippis, principal at Strategic Networks Consulting, Inc. in Rockland, Mass. "If those prices don't come down in parity with what the ATM switch vendors are doing, [ATM

traffic] will potentially be bypassing the backbone router," resulting in ATM workgroups interconnected by legacy routers.

"We don't have a specific application for ATM yet," said Wellfleet user Todd Handel, a network engineer at Telephone Data Sys-

"We're looking at the right architecture to integrate voice, video and data. There are a lot of different options out there. But we're just not really sure what the right one is," Handel added.

# HP, Cisco

Continued from page 4

products that are going to be best for their networks," said John DePietro, WAN analyst at International Data Corp. in Framingham, Mass. "For the end user, it means 'I have more options."

Specifically, the companies will develop 100M bit/sec 100VG-AnyLAN interfaces for Ethernet and token-ring LANs for Cisco's 7000 and 4500 router lines. HP authored the 100VG-AnyLAN draft standard.

"This is something that HP needed to validate 100VG-AnyLAN," said Fred McClimans,

principal of consultancy Decisis, Inc. in Herndon, Va. "Cisco support is a strong boost, given that Cisco controls the majority of the router market." The compa-

majority of the router market," McClimans said.

"Cisco support

is a strong

boost, given

that Cisco

controls the

nies said they will also work on integrating 100VG-AnyLAN technology with Asynchronous Transfer Mode switches. They did not go into detail on this aspect of the relationship.

Also, HP and Cisco will collaborate on the development of routing modules for HP's AdvanceStack stackable hubs. That will position the AdvanceStack systems as integrated routing hubs useful for branch office internetworking applications.

The modules will run Cisco's Internetwork Operating System software, meaning they will interoperate with Cisco's vast installed base of backbone and access routers.

#### **KEEPING PACE**

HP and Cisco said they will also write a common software framework that will ensure interoperability and portability of routing functionality among their internetworking products. HP's AdvanceStack routers evolved from Wellfleet Communications, Inc. code, but HP has not kept pace with Wellfleet upgrades for two years, according to Brice Clark, strategic planning manager of HP's Roseville, Calif., networks division.

This software development effort will let users mix and match HP and Cisco gear from the backbone to the branch office.

To better support such a mixed environment, HP and Cisco said they will use HP's OpenView management platform as the integration point for their internetwork management tools.

The companies will provide for interoperability of their current management products, which include hub, router, LAN probe as well as traffic monitoring applications from both HP and Cisco's CiscoWorks router management product. They will also develop new applications to manage products evolving from their alliance.

Finally, HP and Cisco will adopt common standards for their jointly developed products, specifically in the areas of router protocols, bandwidth-on-demand and multimedia traffic support.

The first jointly developed products will emerge in mid-1995. They will be the 100VG-AnyLAN interfaces for the Cisco routers and the Cisco routing modules for the Advance-Stack hubs, an HP spokesman said.

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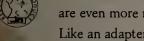
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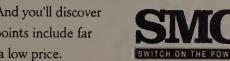


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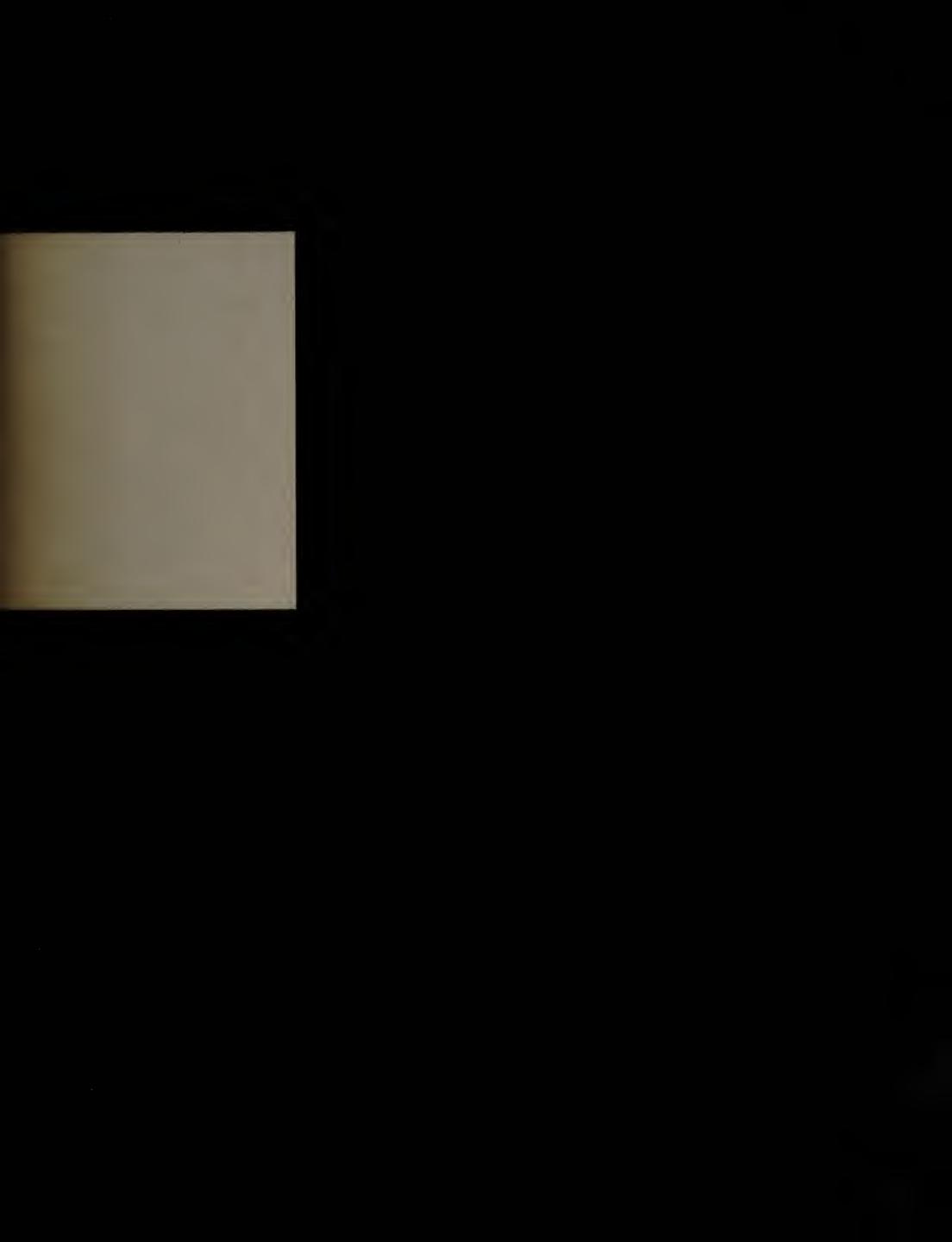
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Continued from page 1

controller lines. "For users, we are detailing a omplete migration strategy for letting their NA backbones more efficiently incorporate multiprotocol environments."

Users already deploying multiprotocol

devices can count on IBM to offer new router and controller features to aid the effort, according to McGee.

The chief component in IBM's new nigration strategy is he new stand-alone ront-end processor FEP), the Nways 3746 Model 900,

which McGee said will be outfitted to support **ICP/IP** routing protocols such as the Routing Information Protocol.

As expected, the box will also support:

Advanced Peer-to-Peer Networking Network Node (NN) features, which will position t as a controlling node in an APPN net.

■ APPN's High Performance Routing (HPR)

A Simple Network Management Protocol Management Information Base so it can be managed by any industry-standard SNMP management platform (NW, Sept. 5, page 4).

An Enterprise Systems Connection channel to the mainframe.

A frame relay and an Asynchronous Transfer Mode interface.

IBM designed the 3746-900 as an expansion init for the aging 3745 front end, but its strategic purpose is to allow users who want to migrate SNA to APPN and employ a multiproocol backbone to do so without throwing out he existing 3745.

Users would unbolt the 3746-900 when they no longer need to support hierarchical SNA and have what essentially is a channel-

attached multiprotocol router capable of nandling APPN/HPR or TCP/IP, analysts

#### CANNIBALIZING SALES

Sales of 3746-900s could cannibalize sales of existing 3745 models, analysts said, but IBM's long-term goal is to keep mainframe-controlled backbones out of he hands of router vendors - particuarly Cisco Systems, Inc., which earlier this year licensed bus-and-tag and ESCON channel technology from IBM's mainframe division.

Michael Zadikian, product manager or IBM networking at Cisco, countered: 'We still think the best way for users to et TCP/IP to the mainframe is via a channel-attached router, and there's nothing IBM can do to change that. We don't think FEPs or 3172s are the answer

olva users are looking for. But IBM is not stopping at the FEP or 3172. It will also combine the function of the 3746-900 with a future version of TCP/IP software on the mainframe that

will let any TCP/IP-based nets attached to the 3746-900 talk directly and natively to the mainframe, improving throughput over today's connectivity by as much as 50%, McGee said.

Today, TCP/IP nets can be attached to a 3745, but they must be registered with the FEP's Network Control Program and the mainframe's VTAM program, which slows down performance.

According to McGee, native TCP/IP routing protocols would also be added to IBM's other controllers - the 3172 Interconnect Controller and the 3174 Establishment Controller. Both boxes currently support TCP/IP devices, but McGee claimed IBM will beef up that sup-

"We will eat our

own young

any router

vendors

network."

before we let

cannibalize this

segment of the

- Rick McGee

port.

"All of our controllers and routers will be able to transport LAN internetwork data via bridging, or over frame relay packet switching or Data Link Switching," McGee said. "Combine the TCP/IP functions on the controllers along with our SNA and APPN/HPR

support, which will be complete by the end of 1995, and users can build enterprise backbones using whatever protocol they want."

In a nutshell, by the end of 1995, IBM will offer frame relay, TCP/IP routing, APPN NN and HPR, as well as dependent LU Server/ Requestor across its router and controller lines. The 3746-900 and 3172 will get ATM interfaces in that time period, too.

"IBM has come to the realization that they can provide the best migration paths for SNA users," said Frank Dzubeck, president of the Communications Network Architects, Inc. consultancy in Washington, D.C. "The key for IBM now is to execute this plan."

Because this announcement was heavy on promises and not on deliverables, users should take it with a grain of salt, noted Anura Guruge, an independent analysts in New Ipswich,

But big SNA users, such as those at the Social Security Administration, like what IBM plans to offer. The agency expects to deploy multiple 3746-900s and other products detailed in IBM's new migration strategy as soon as they are available.

#### IBM product roundup

#### 3746 Model 900

- Token-Ring and ESCON line interface cards
- SNMP MIĔ

#### **Nways 2210 Multiprotocol Router**

- Branch office router
- Supports PPP, frame relay, X.25 and SDLC
- Routes TCP/IP, IPX and AppleTalk, and SNA via DLSw

#### **6611 Network Processor Models 125, 145, 175**

- Multiprotocol Network Program Release 3
- Improved SNA/NETBIOS traffic handling capabilities
- Supports ranslational bridging (Ethernet-to-Token Ring)
- New 2-port LAN adapters
- New 4-port combination LAN/WAN adapters

### IBM AIX Router and Bridge Manager/6000

Added ability to monitor NETBIOS and LLC2

#### **LAN Network Manager**

 Now capable of managing remote devices bridged to the 6611

> "The central issue is integrating SNA and multiprotocol environments, and we think the 3746-900 will help us do that in the next year," said James Harrington, director of WAN engineering for the office of telecommunications in the Social Security Administration in Balti-

## Stanford

Continued from page 1

Air Force is using software to manage an experimental six-node ATM network.

Called the ATM Network Management Assistant (ANMA), the application runs on Hewlett-Packard Co.'s Unix-based OpenView platform and uses a knowledge-based inference engine from Gensym Corp. and an Oracle Corp. database. Initially, ANMA only manages GTE Corp.'s SPANet ATM switch, but Stanford Telecommunications is working to broaden the software's reach.

ANMA was created to fill in the missing link in ATM networking, said Wayne Fuller, department manager at Stanford Telecommunications.

"[With ATM] you've got a scarcity of standards, a bunch of new products and a technology that is high-speed, scalable and multimedia," Fuller said. "It's not like it's SNA, which we've used for a decade and know when it's getting bad or looks good. Those are new challenges for ATM."

To meet those challenges, Stanford Telecommunications built six components into ANMA that were designed to optimize the performance of ATM switches and networks. These include performance and fault measurement components, as well as modules for management of virtual networks, routing

tables and domains. It also includes the ANMA user interface.

The performance management component relies on HP's OpenView application program interfaces (API) and the Oracle database. ANMA can collect performance data directly from agents in ATM equipment using Open-View's Simple Network Management Protocol and the X/Open Company, Ltd.'s X/Open Management Protocol. That information is then stored in the Oracle database, which serves as a repository for multiple distributed ANMA consoles.

The fault management component is based on Gensym's G2 inference engine. The engine reads the performance data from the Oracle database and uses predefined rules - such as dependencies between ATM switch components — to attempt to identify, correlate and diagnose failures and system degradations.

If performance degradation is detected, the virtual network reconfiguration application suggests network topology changes to improve performance and initiate new services.

Based on these recommendations, the routing table management component suggests updates to routing tables at each switch to accommodate the virtual network reconfigurations, including new carrier services. It also calculates cost differences between existing network paths and new ones suggested by the reconfiguration.

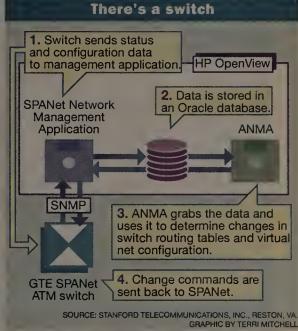
The domain management component performs failover functions by reallocating mangement responsibilities among distributed ANMAs in response to console failures or loading problems. And the user interface provides simultaneous, multiuser write access to fault and configuration data. This enables users to set up management work spaces whereby write access is granted only to fault or configuration data, Fuller said.

#### AIR FORCE AS BETA

The Air Force is using ANMA to manage its Secure Survivable Communications Network

(SSCN), an experimental research and development network. SSCN comprises six GTE SPANet ATM switches and ATM services from MCI Communications Corp. The switches are located at military installations in Arizona, California, Massachusetts, New Jersey, New York and Virginia.

OpenView consoles running ANMA and GTE's SPANet Network Management (SNM) application are at each switch site. The switches are equipped with SNMP agent software that responds to polls from the OpenView consoles.



If a fault occurs with an SSCN line or a switch, SNM will collect status and configuration information from the switches and store it in an Oracle database. From there, ANMA retrieves the data and issues commands to the switches to update routing tables and reconfigure virtual connections.

"It provides a level of intelligence for us to be able to foresee and react very quickly to impending network degradation, failures and faults," according to Nick Kowalchuk, program manager for SSCN at Griffiss Air Force Base in Rome, N.Y. "The network management system now becomes more of a proactive entity."

#### **SVC SUPPORT**

Today, ANMA only supports ATM permanent virtual circuits and the SPANet Management Information Base (MIB). But Stanford Telecommunications plans to support switched virtual circuits once standards for switched connections stabilize and vendors support them in their products.

For vendor-neutrality, Stanford Telecommunications is working with the Defense Information Systems Administration (DISA) to make the application switch-neutral. That will be accomplished through support of the Internet Engineering Task Force's ATM MIB, dubbed the AToM MIB.

DISA's Joint Interoperability Test Center in Fort Huachuca, Ariz., has ATM switches from Newbridge Networks, Inc., Fore Systems, Inc., General DataComm, Inc., BBN Computer Corp. and GTE, and each switch has its

Stanford Telecommunications is writing code that will map those vendor-specific MIBs into AToM MIB objects and attributes, according to Fuller. Once ANMA becomes switchneutral, Stanford Telecommunications may offer it as a shrink-wrapped product.

#### **Comments?**

See "Contacts" box on page 2.

# Big Three

Continued from page 1

been raising basic tariffed long-distance rates in lockstep. The only customers unaffected are large companies with sophisticated custom deals, such as AT&T Tariff 12 contracts, that are immune to tariff changes.

Those customers are enjoying the view from the catbird seat.

"Carriers are willing to do just about anything to get your business; we can practically name our price," said Jack Sadler, group man-

ager of technical services at American Stores, Inc., a \$19 billion nationwide food/drug retailer based in Dublin, Calif. "I think this is because they are trying to lock in business in light of the upcoming RBHC entry."

Even midsize companies — such as AT&T's UniPlan customers — now have the ability to slash their costs at the start of a multiyear term through big credits and discounts offered in contract tariffs.

But few of these arrangements stabilize rates; one source estimated that only a third to a half of the top 1,000 U.S. firms have rate-stabilized deals.

The reason is that, except for the companies generating the largest traffic volumes, the price breaks aren't meaningful enough to sacrifice being locked into a service plan for several years when needs could change dramatically, said Brian Moir, legal counsel to the International Communications Association (ICA) user group and a partner in the law firm of Moir & Hardman in Washington, D.C.

"There is a pretty high percentage of companies paying straight tariff rates or tariffs less a certain discount," agreed Bob Wallquist, vice president of regulatory affairs for the Tele-Communications Association (TCA) user group.

Basic service price hikes — such as AT&T's three 4% increases in the past year — directly affect these users.

Wallquist said the TCA has been "fighting for years" the catch-22 users find themselves in when they negotiate a percentage discount in return for a multiyear spending commitment—then get hit with a tariff hike soon after.

AT&T, MCI and Sprint dismiss the tariff rate increases as irrelevant to the discussion of industry competitiveness because — overall — interexchange carrier (IXC) average per-minute revenues have been steadily decreasing (see graphic, page 1).

Don Evans, MCI director of federal regulatory affairs said, "Despite all this hoopla that

"The biggest companies

wouldn't have

the luxury of

negotiating

contracts for

low prices if

other

companies

weren't filling in

the [financial] voids."

the IXC market isn't priced competitively, there are very few customers who buy basic service."

He said promotions more than offset any basic service price increase for customers.

Some users disagree.

"The environment today is an

oligopoly, and really, everyone is affected by it," said Phil Evans, director of telecommunications at Perot Systems Corp. in Dallas and an ICA member. "The biggest companies wouldn't have the luxury of negotiating contracts for low prices if other companies weren't filling in the [financial] voids," he said.

Added William Coopman, manager of telecommunications at Deere & Co., a worldwide agricultural equipment maker based in Moline, Ill., "There are only a few hundred custom contracts [unaffected by tariffs]. The other users are just sitting there wide open, taking the bullet."

#### THE RBHCs' ROLE

And it could be a while before new longhaul entrants, such as the RBHCs, intercept the bullets.

Evans, for example, said that if granted permission to get into long distance, the RBHCs will be confined to certain calling areas until they can get coverage alliances in place.

Nonetheless, the long-haul carriers do not look forward to going up against such well-heeled and -connected competitors.

"We welcome competition, but not from monopoly companies that control access to our customers," an AT&T spokesman said. "Until there is plenty of local choice for access, the Bells should not be in long-distance business. Monopolies and competition don't mix."

MCI's Evans agreed. He added that some RBHCs have promised long-distance rates at 60% less than current service if they are allowed into the market. "We pay 40% of our long-distance costs in access," he said. "The RBHCs must have some grand cross-subsidy plan" that would tilt the playing field in their favor, he said.

Others said they are concerned that letting the RBHCs into long distance will affect the quality of local service, especially since so many still have catching up to do with switched digital services such as ISDN.

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Senior Washington Correspondent David Rohde

contributed to this report.



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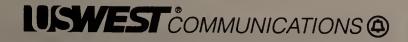
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Again, things are great. Will write again soon. Wish you were here.



The fold-out U S WEST Guide to the Information Highway. Suitable for framing. Or glove compartments.



## $\mathbf{ATM}$

Continued from page 1

Start-up FVC has already garnered support for its plans from some powerful players, including IBM, InSoft Corp., InVision Systems Corp., Lotus Development Corp., Macromedia, Inc., Novell, Inc. and Teleos Communications, Inc.

But not everyone is ready for it. "Some users need this technology right now for individual business units that do on-line training or generate multimedia presentations," said

ilar to MOS in order to run multimedia applications effectively at the desktop," Baylock said. "OLE provides the basis for that. But right now, FVC is the only one providing it."

The MOS runs on FVC's line of client Media Adapters as well as its Media Server, a network-attached device that offers 8G bytes of Redundant Array of Inexpensive Disks (RAID) storage for audio, video and flat files. It can support 100M bit/sec datastreams to up to 80 users simultaneously. FVC codeveloped the server with Conner Peripherals, Inc.

The media server connects to a user's desktop through FVC's line of ATM adapter cards or to FVC's Media Switch via a 155M bit/sec interface.

The Media Adapters support a variety of speeds (25M, 51M, 100M and 155M bit/sec), as well as media and personal computer bus architectures. They are based on a Reduced Instruction Set Computing processor, support the ATM Forum's class-of-service definitions, allowing video and data traffic to run simultaneously on the same LAN.

The Media Switch is an ATM switch that is available in four versions, scaling from eight to 24 ports. Initially, the switch will support 100M bit/sec ATM Transparent Asynchronous

Transmitter/Receiver Interface, with support for 25M, 51M and 155M bit/sec interfaces added in the future.

The switches, which support throughput of two million cells a second, can be stacked five high, providing an aggregate capacity of 5G bit/sec and connecting up to 120 end nodes. All come equipped with an Ethernet interface for links to existing LANs, with token-ring and Fiber Distributed Data Interface connections coming in future releases.

In a typical setup, the MOS will direct data requests from, say, a Notes user to the appropriate LAN server via the Media Switch. When



FVC President/CEO Ralph Ungermann

Joseph Baylock, vice president of networking technologies at Gartner Group, Inc., a consultancy in Stamford, Conn. "Until the technology matures, however, it will likely be confined to small pockets and not spread across the enterprise."

But FVC's low pricing may allow users to implement the technology more widely in their networks.

'It's nice to see desktop multimedia products starting to emerge because we're getting ready to develop some on our own in order to meet our needs," said Tim Kuhfuss, highspeed networking manager at Argonne

"The MOS is

really ATM

National Laboratories in Argonne, Ill. "[FVC's] price points are really attractive and will likely mean deployment to a wider community, not just high-

middleware that acts as the glue between all the pieces of end users." FVC's FVC's product system." set is centered on

its Media Operating System (MOS), which augments existing NOSes, such as Novell Net Ware and Microsoft Corp. Windows for Workgroups and Windows NT, with ATM and real-time multimedia capa-

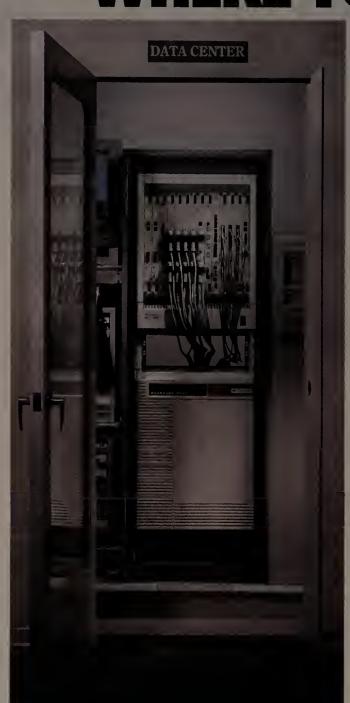
"The MOS is really ATM middleware that acts as the glue between all the pieces of FVC's system," said Jennifer Pigg, program manager for data communications at The Yankee Group, a Boston consultancy.

The MOS is based on Microsoft's Object Linking and Embedding (OLE) technology. "Other vendors will have to do something sim-



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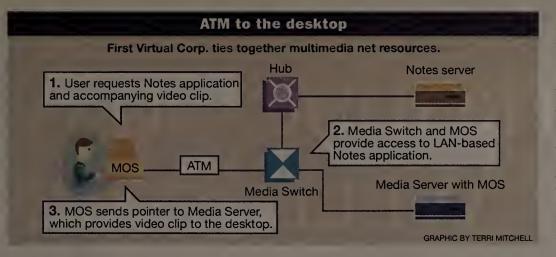
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the application is opened and a video pointer is discovered, the MOS will direct that portion of the request to the Media Server (see graphic).

When the Notes data and videostreams are sent back to the desktop, the MOS labels the packets separately, giving each stream its own channel within the desktop ATM connection. 'By channelizing the ATM connection, the MOS can ensure that the data, voice and videostreams that make up one multimedia applicaion reach the desktop without interference," Ungermann said.

Analysts said FVC's adapters and switches match up well against products from estab-



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MAX. PDRT DENSITY	500	200	240	336
TOPOLOGIES	Ethernet, Token Ring, FDDI, ATM	Ethernet, Token Ring, FDDI, ATM	Ethernet, Token Ring, FDDI	Ethernet, Token Ring, FDDI, ATM
ROUTING	IP, IPX, DECnet, Appletalk	No Routing	No Routing	IP, IPX, DECnet Phase IV, AppleTalk, XNS, OSI, X.25, RIP, OSPF, BGP, ES-IS, IS-IS, Transparent Bridging and Source Route Bridging
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you're ready to bring ATM capabilities like multimedia to the desktop, it's as easy as adding a card to the Enterprise Hub's cell-based backplane.

In addition, the Enterprise Hub's ATM backplane allows you to add, segment, and define virtual LANs, on the fly, right from your network management station.

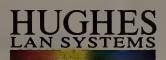
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lished ATM vendors such as Fore Systems, Inc. and Newbridge Networks, Inc. in terms of standards support and performance. But FVC's hardware may be the least important thing, said Fred McClimans, principal at Decisis, Inc., a consultancy in Herndon, Va.

'The multimedia applications FVC is targeting are the real story here, not who has the fastest switch," he said. "We're not talking about your vanilla videoconferencing applications. This is about things that will change the way people do their daily tasks, such as putting together a multimedia presentation or tapping into news feeds while communicating with a client in real-time through E-mail."

But according to Pigg, FVC's system is proprietary and could be out of step with multimedia ATM standards as they appear over the next few months. "That risk, however, is minimized because FVC's products are softwarebased, which makes it easier - in theory - to update and modify," she said.

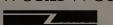
The MOS costs \$2,000, \$5,000 and \$12,000 for 10-, 30- and 100-user licenses, respectively. The Media Server costs \$20,000 for 8G bytes of storage and \$15,000 for 4G bytes. The Media Switch ranges from \$3,400 to \$8,000, while the adapters cost between \$330 and \$1,200.

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#### **Comments?**

See "Contacts" box on page 2.

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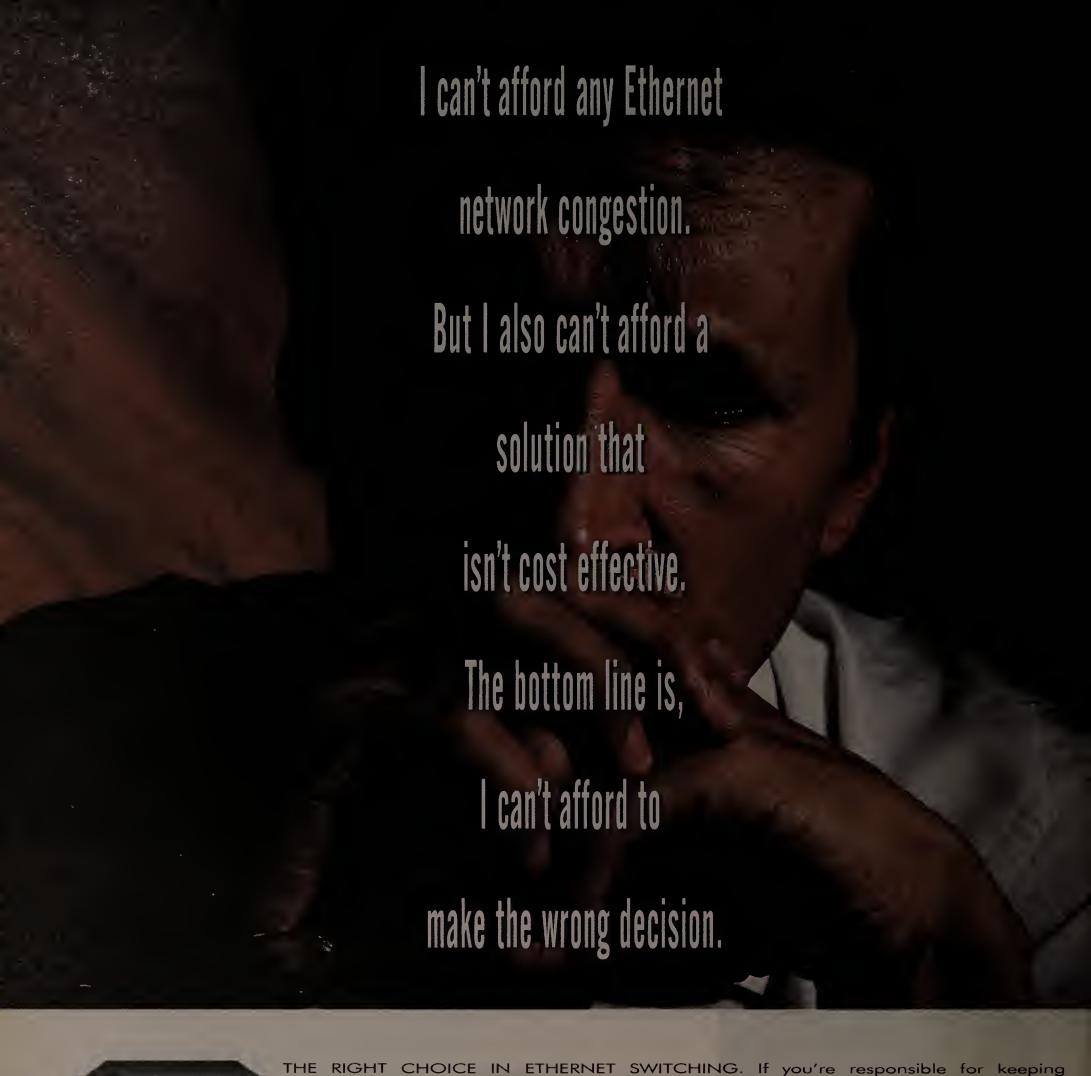
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